CALIFORNIA
OIL WORLD
and Petroleum Industry

PUBLISHED TWICE A MONTH — ENGINEERING — TECHNOLOGY — LATEST NEWS

FIRST ISSUE
OCTOBER 1943
VOL. 36 NO. 19
WHOLE NO. 1642

UNITED STATES TREASURY DEPARTMENT

For distinguished services rendered in behalf of the War Savings Program, this citation is awarded to

California Oil World & Petroleum Industry

Given under my hand and seal on June 12, 1943

Henry Morgenthau Jr.
SECRETARY OF THE TREASURY

In the service of our country

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PETROLEUM PUBLISHERS, INC. 939 SO. BROADWAY BLDG.
LOS ANGELES 15, CALIFORNIA-MEMBER OF THE AUDIT BUREAU OF CIRCULATION

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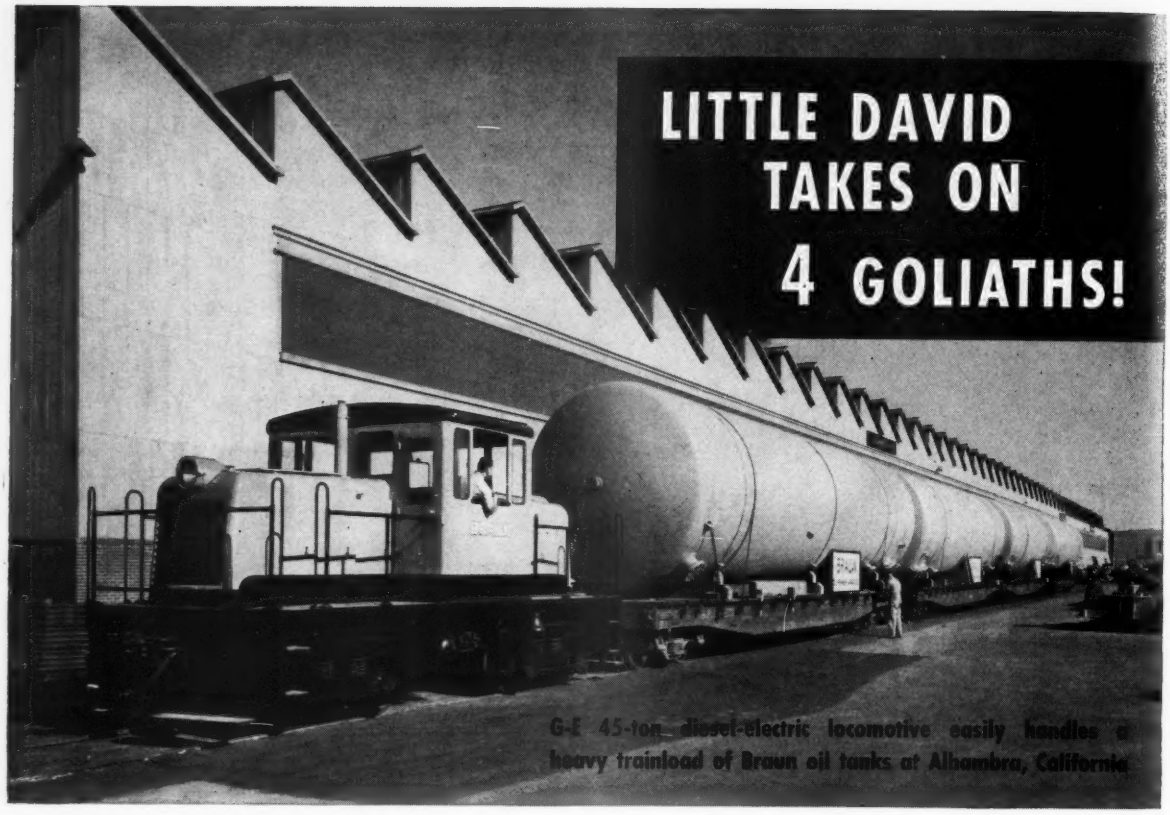
California Oil World and Petroleum Industry is published twice a month at 1009 in the 939 So. Broadway Bldg., Los Angeles 15, California. Entered as Second-Class Matter January 16, 1937, at the post office at Los Angeles, California, under the Act of March 3, 1879. Subscription price $1 per year in U. S. and Possessions, $2 in foreign countries, including Canada. Member of the Audit Bureau of Circulations.

October 8th, 1943

Telephone Number TUcker 2571



G-E 45-ton diesel-electric locomotive easily handles a heavy trainload of Braun oil tanks at Alhambra, California

"AMAZING!" say C F Braun & Co, Alhambra, California. "It's amazing how this small 45-ton G-E locomotive performs. And keeps it up 24 hours a day, seven days a week. It is a fine job. It works well. It has that clean, modern look that comes only out of good design."

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CALIFORNIA OIL WORLD AND PETROLEUM INDUSTRY, FIRST ISSUE, OCTOBER, 1943

Carrington King

Reports From Washington

As the Allied war effort gains momentum and increased action in all theaters of war is reflected in every issue of the daily papers the time when a cut will occur in the gasoline ration coupons of California and other Western motorists is almost here.

The effect of mighty withdrawals of 100-octane gasoline and other light products needed to keep the war machine rolling will be felt throughout the United States. California — singularly fortunate up to now in its gasoline supplies — will find the tightening of restrictions more painful than most areas in the country, partly because it is an oil-producing state accustomed to plenty, and partly because the discomfort of stricter rationing will be more acute in a community where many individuals live far from their places of business.

Coming events cast their shadows before. Two shadows promising an early crack-down on West Coast gasoline coupons are the instructions from Petroleum Administrator Ickes to Pacific Coast refiners, calling for a decrease in the manufacture of premium gasoline, and the special meeting at which California and other Western members of Congress were told by officials of the Petroleum Administration for War that the gasoline picture in District 5 looks dark indeed.

A 15,000 B/D slash for states in Districts Four and Five was predicted by Ickes and Davies while members of Congress yowled about the cut from approximately 100,000 barrels daily (civilian gasoline consumption.)

When and how present A, B, and C card values will be cut is up to Federal officials, it was indicated by Charles Phillips, gasoline rationing director of the OPA, but "every effort will be made to see that gasoline is placed in the hands of workers who must use automobiles for essential driving."

Approximately 40 members of Congress from Districts Four and Five banged away at Ickes and Davies when they insisted California production is at maximum practicable levels and the only way to meet rising war requirements is to prune the civilian gasoline consumption.

Davies warned stocks are falling and spread between demand and production is widening. Also, with probable stepping up of military operations against Japan, war requirements in 1944 will take 52.4 per cent of all gasoline produced in Districts Four and Five, Davies warned. Military demands in 1942 amounted to only 23 per cent.

In order to provide more aviation and 80-octane all-purpose military gasoline for shipment to our fighting forces, Ickes ordered a limitation of the production of premium gasoline to not more than 10 per cent by volume of the total civilian automotive gasoline manufactured. Deputy Petroleum Administrator Ralph K. Davies warned that in cool weather motorists will have more trouble starting their cars, due to the slight reduction in violatility of regular gasoline, but both he and Ickes expressed confidence the West Coast would accept this slight hardship cheerfully.

"It is imperative that stocks of aviation gasoline and 80-octane all-purpose military gasoline be built up so that all demands for these important petroleum products can be met without delay," Ickes said. "This is in line with PAW's policy of being ready at all times to meet military and naval requirements, whatever they may be. We believe in being prepared, and the only way to be prepared is to have adequate inventories.

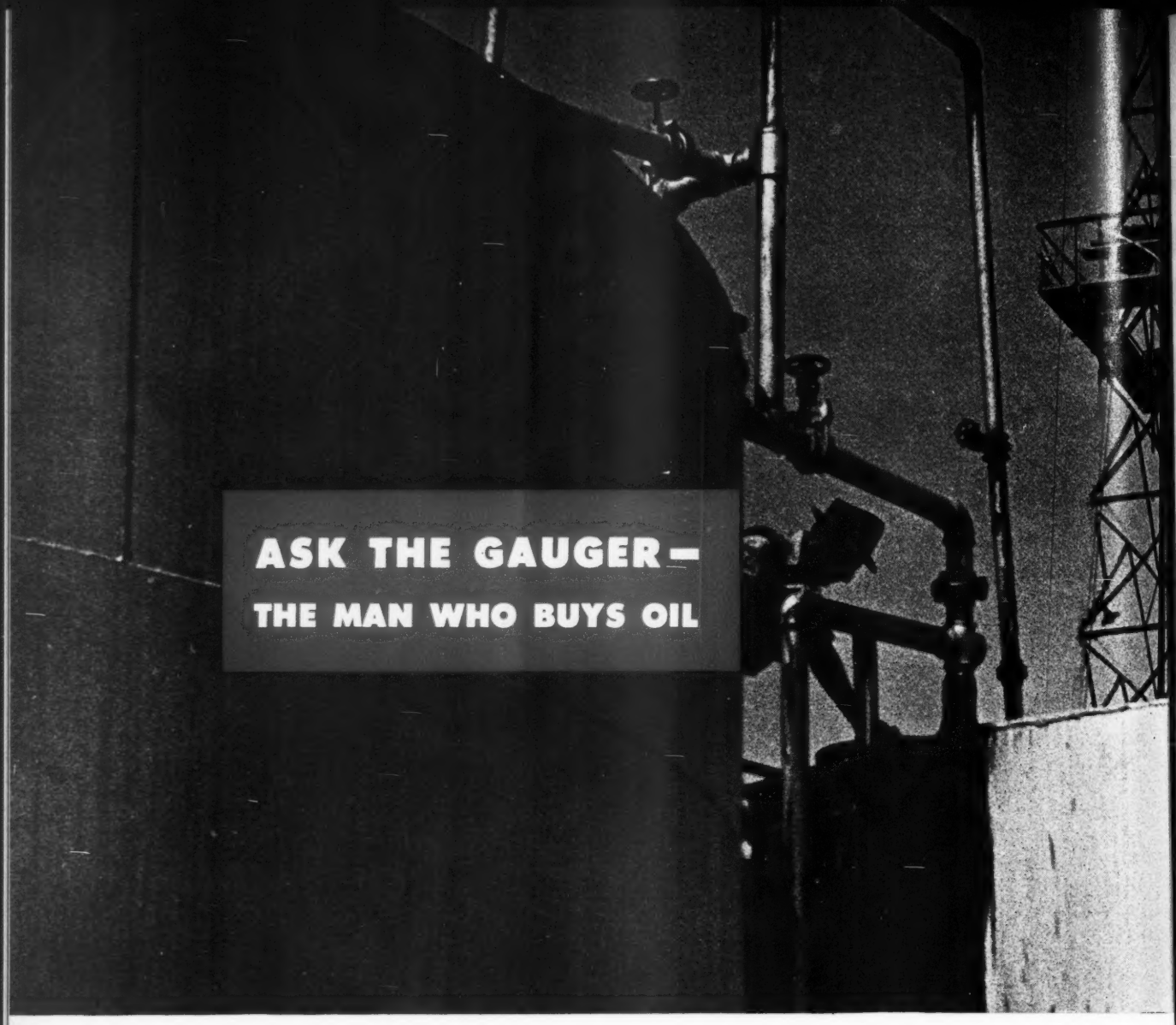
"What is significant is that this action will affect civilian motorists. To provide adequate stocks of gasoline for the military services, it will be necessary, first, to reduce the quantity and violatility of premium gasoline that is manufactured and, second, to reduce somewhat the volume and violatility of regular (house brand) gasoline.

"I am certain that West Coast motorists will understand that only by taking these measures can we meet increasing military requirements."

One of the biggest problems with which PAW is wrestling is the need for more gasoline and heating distillates, according to Davies. We have "more than enough" of residual fuel, he told California Oil World, but military demands for lighter products are exceeding production.

"A very difficult balancing job has to be done," Davies said. "We have one of the toughest juggling acts to perform over the next few months that we have ever faced. As more and more of the light fractions of petroleum go to war, we shall have more trouble in controlling production of the products we want."

While Congress has not yet shaken down from its summer recess the lawmakers will find plenty of oil matters awaiting their attention. Disposition of the Elk Hills case; the annual row with the Treasury Department over retention of the depletion allowance; the dyna-



ASK THE GAUGER—
THE MAN WHO BUYS OIL

It is the gauger's job to test every tank of crude before it is shipped. He checks the B.S. & W. content, the A.P.I. gravity, the volume, the temperature and all other pipeline acceptability specifications. Every year gaugers all over the country pass on millions of barrels of crude. These gaugers know that, where a Petreco Electric Dehydrator is on the job, the dehydrated oil is well within pipeline specifications. They are in an excellent position to see that Petreco Electric Dehydrating insures consistent performance, low cuts and high gravities.

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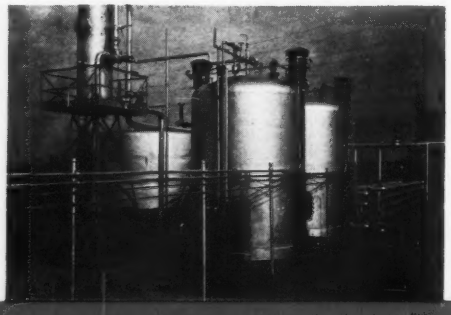


DEHYDRATING **DESALTING**

COMPLETE REFINERY AND OIL FIELD SERVICE

mite-loaded issue of a 35c-per-barrel increase in crude prices and some sort of showdown on the rationing policies of the Office of Price Administration lead the list.

As California Oil World goes to press, Standard Oil Co. of California and Navy Department petroleum reserve experts still are working on a new contract through which the Navy would take over the company's Elk Hills holdings—meanwhile producing from the field under a temporary 90-day agreement. The issue will get hot when Congressional hearings are resumed, although to date it has not been determined whether a joint committee, comprising members of the House Public Lands Committee and the House Naval Affairs Committee, will pick up the reins, or whether the former group will resume where it left off in mid-summer.

A lively battle between proponents of the crude price increase and their adversaries is definitely scheduled, with Congress probably more ready to jump into the fray than at any time since the issue was raised. Strong Congressional support can be expected—especially because of the growing aversion to subsidies which is sweeping the country.

Although pretty well bottled-up by President Roosevelt's injunction prohibiting the public quarreling of Federal agencies, it seems unlikely that violent differences of opinion between Ickes and Price Administrator Brown can remain unpublicized much longer. With the issuance of ration coupons in this section of the country exceeding allotments of gasoline coming into the Eastern area, PAW is increasingly grim about OPA's handling of the ration problem. . . . The letters exchanged by Ickes and Brown over the crude price matter were not conducive of peace between the agencies.

Departure of Robert E. Allen, Assistant Deputy Petroleum Administrator and former assistant oil umpire in California, to New York, where he has accepted a position with the American Petroleum Institute, left a gap in the PAW executive staff. The former California oil men—acting as a sort of liaison between New York and Washington—is tackling the job of giving the American public an accurate picture of the petroleum situation.

After staying pretty much out of the picture, during the early days of the Elk Hills investigation, Standard of Cal. is very much in evidence in Washington this fall. F. S. Bryant, vice-president and director; Ed Waite, public relations chief; Tom Travis, marketing expert; H. O. Thompson, new public relations man for the Eastern area, and Roy Hines, Standard attorney—to name only a few—have spent much time here preparing for any eventuality that may occur when the time comes for a review of the new contract.

Some interesting California developments are expected when the Petroleum Industry War Council convenes for its October meeting. . . . And an innovation of the meeting will be a dinner at the Statler Hotel to which the PIWC is inviting members of the council, and Congressmen from District 3, plus Oklahoma and Kansas. In November, it is planned to have members of Congress from Districts 5 and 4 at the second dinner of the series. . . . No holds will be barred, according to the PIWC, and PAW and Congressional guests will shoot from the hip.

Ickes Commends California Oil Producers

Petroleum Administrator for War Harold L. Ickes on September 23 commended West Coast oil producers for saving thousands of feet of steel casing by reclaiming operations.

Total recovery of steel casing by Pacific Coast operators is currently at the rate of about 75,000 feet a month.

Administrator Ickes said:

"It is gratifying to report that, as a result of the cooperation of oil producers on the Pacific Coast, thousands of feet of valuable steel-casing have been reclaimed, largely from producing wells where overlapping strings of pipe were located, without jeopardizing the production of the wells.

"In District 5 (Pacific Coast), at least a million feet of casing have already been reclaimed, and the total is mounting each month. This means that the oil producers are able to continue important drilling operations despite shortages of new materials and equipment."

Deputy Administrator Ralph K. Davies said that the reclamation survey conducted by PAW's Production Division with the cooperation of petroleum industry committees continues to progress on a nationwide basis.

Mr. Davies cited outstanding examples of the quantity of casing being reclaimed on the West Coast. The companies, number of feet of casing already reclaimed and the current monthly rate of reclamation follows:

Standard Oil Company of California, 185,000 feet reclaimed, current rate 17,000 feet a month; Shell Oil Company, 126,000 feet reclaimed, 21,000 feet a month; The Texas Company, 50,000 feet reclaimed, 85,000 feet a month; General Petroleum Corporation, 75,000 feet reclaimed, 12,000 feet a month; C.C.M.O. Company, 7,000 feet a month; and Union Oil Company, 7,000 feet reclaimed, current rate of 2,500 feet a month.

Praising the reclamation efforts of operators throughout the country, Mr. Davies said:

"The nationwide reclamation program is being conducted under the guidance of a PAW staff of only three men, thanks to the cooperation of industry committees in all sections of the country. This progress in reclaiming steel casing is being made despite the fact that the industry is critically short of engineers, who have been relied upon to assume the major responsibilities in this work."

Reclaimed steel casing is usually suitable only for re-use in the drilling of shallow wells. It cannot be used to meet the demands for new casing inasmuch as new casing is required for deep-well drilling. However, the reclaimed casing replaces the new casing that otherwise would be required for shallow-well drilling and for intermediate strings in deep wells.

P. A. W. Issues Suggestions on Manpower

Specific suggestions for maximum efficient use of available manpower in oil well drilling operations were outlined for oil producers on September 20 by the Petroleum Administration for War.

Taking cognizance of a growing manpower shortage which has delayed drilling of individual wells as long as 90 days, Petroleum Administrator Harold L. Ickes said that the results of a partially completed nationwide survey indicate that unless former oil workers can be induced to return to the industry, the wildcat and oil field development programs will fall far behind schedule.

"In the meantime," the Administrator emphasized, " it is urgently necessary that the industry utilize to the fullest extent every man presently available to it. With this in mind, we believe it is consistent to urge that producers and operators who employ the services of drilling contractors give serious consideration to the following five points:

"1. That the drilling of wells by producing companies be scheduled in advance to produce a continuity of operations for the contractors' crews and equipment, in so far as is practicable;

"2. That the contractor be given notice at least 30 days prior to the time of permanently releasing his men and equipment so he may seek work elsewhere for this equipment and these crews;

"3. That companies contemplating the use of contractors' services give the contractor as much as 30 days' notice, whenever practicable, before requiring him to move onto a new location;

"4. Where an unavoidable delay may be occasioned and the time for such delay can be computed, that the contractor be notified of the length of such delay so that his men will be laid off for only a definite period of time, instead of indefinitely;

"5. In proven territory where use of more than one rig is contemplated by a producer, permit the contractor to have at least two rigs in operation so that a savings may be effected in supervision, trucking equipment, and equipment used in setting various sizes of casing."

PROGRAM
of
PETROLEUM DIVISION
A. I. M. E.
FALL MEETING
Ambassador Hotel
Los Angeles, California
October 21-22, 1943

With Cooperation of the Southern California Section A. I. M. E.

Thursday, October 21

Host Room, Ambassador Hotel.

Luncheon meeting for authors, presiding officers of afternoon sessions, and Division officials.

Theatre Lobby, Ambassador Hotel.

Registration of all members and guests.

Registration fee is $1.00 for all except Student Associates who will be the guests of the Petroleum Division.

Sale of technical papers, 75c per set.

TECHNICAL SESSION

Thursday, October 21

Theater, Ambassador Hotel, 1:30 p.m.; N. L. Dorn, Chairman; E. G. Trostel, Co-Chairman. Introduction of Mr. C. A. Warner, Chairman, Petroleum Division, A. I. M. E.

"Fingering and Coning of Water and Gas in Homogeneous Oil Sand" by M. G. Arthur, Union Oil Company of California.

"A Statistical Approach to the Interstitial Characteristics of Sand Reservoirs" by Jan Law, Dominguez Oil Fields Company.

"Optimum Time to Bail and Wash Wells Producing Sand" by J. R. Stitt, Western Gulf Oil Company.

"The Precipitation of Asphalt through Crude Oil by Flow through Silica" by Dr. D. L. Katz, Herman Dykstra, Karl Ben, University of Michigan.

Friday, October 22

Breakfast meeting for authors, presiding officers of technical sessions of both meetings of the day, and Division officials, Host Room at 8:00 a.m.

Theater Lobby, Ambassador Hotel at 9:00 a.m.

Registration and sale of papers continue.

TECHNICAL SESSION

Friday, October 22

Theater, Ambassador Hotel, Carlton Beal, Chairman; Dean H. Sheldon, Co-Chairman. 9:45 a.m.

"Possible Application of Secondary Recovery Methods in California" by C. L. Moore, Office of Petroleum Administrator for War.

"Surface Deposits of Bituminous Sands and Shales in California as Possible Sources of Oil" by G. B. Shea, Petroleum and Natural Gas Division, U. S. Bureau of Mines. Symposium on Problems of Artificial Stimulation of Production by Water Drive.

"Flow into Slotted Liners and Obstructed Core Samples" by C. R. Dodson and W. T. Cardwell, Standard Oil Company of California.

Friday, October 22

Theater, Ambassador Hotel, A. G. Loomis, Chairman; Marshall C. Turner, Co-Chairman. 1:30 p.m.

"Oil and Gas in the Great Lakes and How They may be Developed". The background of the paper is based on construction of Marine Foundations in California and includes new conceptions of marine drilling by Henry Emmett Gross.

"State Legislation and the Oil Industry of California" by R. P. McLaughlin, Consulting Engineer.

"Gun Perforations for Multi-Zone Control in California" by T. H. Wallace, Western Gulf Oil Company.

A Symposium on Operations of Industries of the A. I. M. E. will be conducted by A. B. Campbell of Pacific Coast Borax Company.

Informal Stag Dinner
Sponsored by the Southern California Section
Friday, October 22

Embassy Room, Ambassador Hotel. Walter Abel, Chairman Southern California Section, presiding. 8:00 p. m.

"War and Weather" by Dr. Irving Krick, Chief of Long Range Research Unit, Weather Information, Branch, Headquarters, Army Air Forces.

California's Oil Future Outlined

By E. E. Pyles,
Chairman Production Committee
District No. 5.

It is not necessary for me to review or explore the important contribution the Pacific Coast oil industry is making to our country's war effort throughout the Pacific area. The members of the Interstate Oil Compact Commission, long intimately associated with the petroleum industry, and fully capable of appraising the importance of petroleum products to the fighting forces, well know how vital California's oil fields are to the grand strategy of the United Nations in our war with Japan.

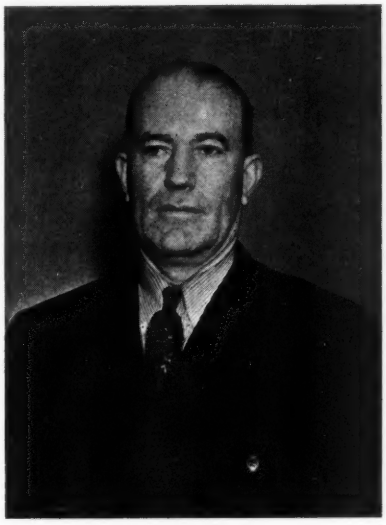
At the same time, you gentlemen fully appreciate how great a price the industry in California must pay in keeping petroleum supplies moving in the quantities necessary to supply the fighting fronts and to support the vast war establishments operating at breakneck speed throughout the Pacific Coast territory.

California Production Increased 300,000 Barrels Daily

Only a few short years ago, the industry in California was striving to curtail production in the interests of conservation and succeeded to the point that output was held for a time below 500,000 barrels daily. Today, California fields are producing better than 775,000 barrels of oil a day and it is contemplated that by April 1, 1944, the State will be producing at a rate of 800,000 barrels daily, or better.

Production of petroleum at the rate of 800,000 barrels per day calls for an annual output of better than 290 million barrels. A flow of oil at this rate means that the war effort, war industry, and essential civilian requirements in the Pacific area are consuming the equivalent of three major oil pools each twelve months. And to maintain our reserves in that State we must discover each year three new pools, representing an ultimate reserve of a hundred million barrels each. We are falling far short of that discovery rate.

To express this figure in yet another way, I might add that California's proven reserves currently are estimated at from 3 to 3.4 billion barrels. The current rate of production, therefore, is cutting into the State's known oil resources to the extent of approximately 10 per cent each year.



E. E. Pyles
(Delivered this very informative paper before the Interstate Oil Compact Commission's Quarterly Meeting at Santa Fe, New Mexico, on Sept. 24.)

The ultimate effect of the war on the oil resources of California can only be measured when we have certain knowledge of the period over which the conflict extends.

Oil fields of the State are now producing very close to their combined maximum efficient rates. Accordingly, every day that demand continues at its present rate or increases measurably, as those who seem to know think it will, some degree of wasteful production will become one of the necessary evils of waging war. In order to minimize this threat as well as increase the rate of recovery from known reserves, drilling in producing fields has been greatly increased. This is shown by the record of 710 completions for the first eight months of this year as compared with 285 completions for the same period of 1942.

Specter of Scarcity Not New

The specter of scarcity is not new to the California petroleum industry, and while the discovery record and the score on exploratory operations over the past two or three years offer but scant encouragement, we must not be overly pessimistic about the California oil picture either from the standpoint of the war's duration or from the standpoint of the post-war period, regardless of the time required to bring the Pacific fighting to a successful conclusion.

The industry in California is now waging a three-pronged drive against the threat of future scarcity, which individually could have an important bearing on the State's reserve picture and collectively will undoubtedly result in protecting the State's ability to meet its wartime assignment, with enough left over to carry us well along into the years of peace which we all hope and trust are not far off.

The three avenues of approach to the solution of the West Coast's supply problem are:

(1) Continued search for new pools.

(2) Research in the field of secondary recovery methods.

(3) Extension of productive life of known pools by means of reservoir repressuring.

Chronology of Exploratory Effort

Let us consider first the opportunities which we in California believe still exist in the field of exploration. I should like to recall for you that in the field of exploration the petroleum industry in California, and in fact in most other states, has gone through a number of stages. Each stage has become more complicated and more costly, and unless the industry is allowed a greater return for the products it is supplying, the results must inevitably be re-

flected in the country's ability to produce petroleum products. It was first believed that in order to get oil, you had to have a seepage. When the seepages were all developed, our geologists then took the view there would be no more discoveries in California. Then they began to work on surface geology, and over a period of a relatively few years, the discoveries due to that division of the science began to lag and there followed the same line of comment. Then followed topographic studies and from that we came to geophysical methods. During all of these periods there were, of course, other restrictions on performance created by limitations on the quality of the materials the industry had available and the prevailing state of the art of drilling. To give an opinion on the known scientific data and the state of the art is one thing and gives rise to a justifiable opinion of geologists and engineers. To say that the results thus arrived at limit the possibilities of finding new production is entirely unwarranted and may in time subject the prophet to ridicule.

We have all heard statements issued by qualified people in the industry that no more oil fields will be discovered in Texas, in California, or in some other state, and we know how subsequent events have treated such predictions. A statement in this vein was quoted to me recently by a pioneer California oil man who gave it as his considered opinion, and I quote, "I can't believe that with all the conditions which exist in Southern California favorable to the accumulation of oil, that the few scattered fields which have been discovered here, which after all are only a fraction of the total acreage in this area, mark the limitation of our future reserves."

Viewpoint of the Industry

When I received your kind invitation to appear before this group and discuss the future oil prospects of California, I did not feel that you were asking me as an individual to appear before you and express my personal views. Rather, I felt, you would appreciate more the opinion of a representative group of oil men daily engaged in the task of finding the hidden treasure chest in which Mother Nature has stored, for our use, those precious fluids which we identify by the term "petroleum" and "natural gas."

To arrive at an estimate of the future prospects for oil discovery in California, I requested the membership in that State of the American Association of Petroleum Geologists, to confer on the problem, to discuss among themselves its general aspects, and to relay to you, through me, a summary of their views. This they have done.

They, of course, realize the problem of estimating the amount of oil that may yet be discovered in California is a difficult one, and they are frank to point out that the answer cannot be more than a guess.

This Geological Division of the California Industry has given much time to a study of the geology of the State and the selection of districts where it is hoped the search and exploration for oil would produce results. In the light of their knowledge and study, I asked them for an opinion of our future oil possibilities. I posed the question, "Is it worth our while to maintain expensive geological and geophysical departments and drill a lot of wildcats hoping to find new reserves of oil?" Their answer is "YES." One might consider that this answer is born of a desire to keep their jobs and maintain their position in our industry but the geologists are daily giving their thoughts to the problem of finding new reserves. No group of men could continue day after day, month after month, and year after year to recommend the tremendous expenditures we have to make for exploration work if they did not believe their chances for success more than warranted it.

The problem of estimating our discoverable oil was attacked from two points of view, namely:

1. How much oil may we expect to find in our presently producing fields from new sands or zones?
2. How much oil may we expect to find from fields yet to be discovered?

For a number of years most of the production of California came from the youngest Tertiary beds, the Pliocene. As the demand for oil increased, deeper and deeper beds were added to the list of producing formations until the Miocene, then the Eocene and finally the lowest of all, the Cretaceous, were shown to be potential productive horizons. Not all of these formations have been prospected in all fields of the State and, in fact, they do not all exist in all of them, but until each field has been prospected down to basement rocks there still exists the possibility of deeper production in them.

Shallower deposits of oil that have been passed up in the scramble for more desirable and more profitable oil in deeper sands will also receive attention. We have recently seen considerable development of shallow oil at Belridge that was neglected before but is very necessary now to help satisfy the demands of war. Shallower zones are also being developed in the old Sunset-McKittrick area. Thus in our presently producing fields there are possibilities for new production both from shallower sands and from deeper horizons.

Productive Areas Relatively Small

Of course, geologists can't tell us now just where the new fields are to be found. However, a glance at the United States Geological Survey map of the Oil and Gas Fields of California is enough to convince one that the total area of the present pools is a small fraction of the whole State. To be sure, there are great mountainous and desert regions in the State that are not potential oil territory. However, the geologic map shows that there are vast areas of the State covered by Tertiary and Cretaceous sedimentary rocks.

These are the formations that are producing now and until those areas have been thoroughly explored we cannot say that California has no

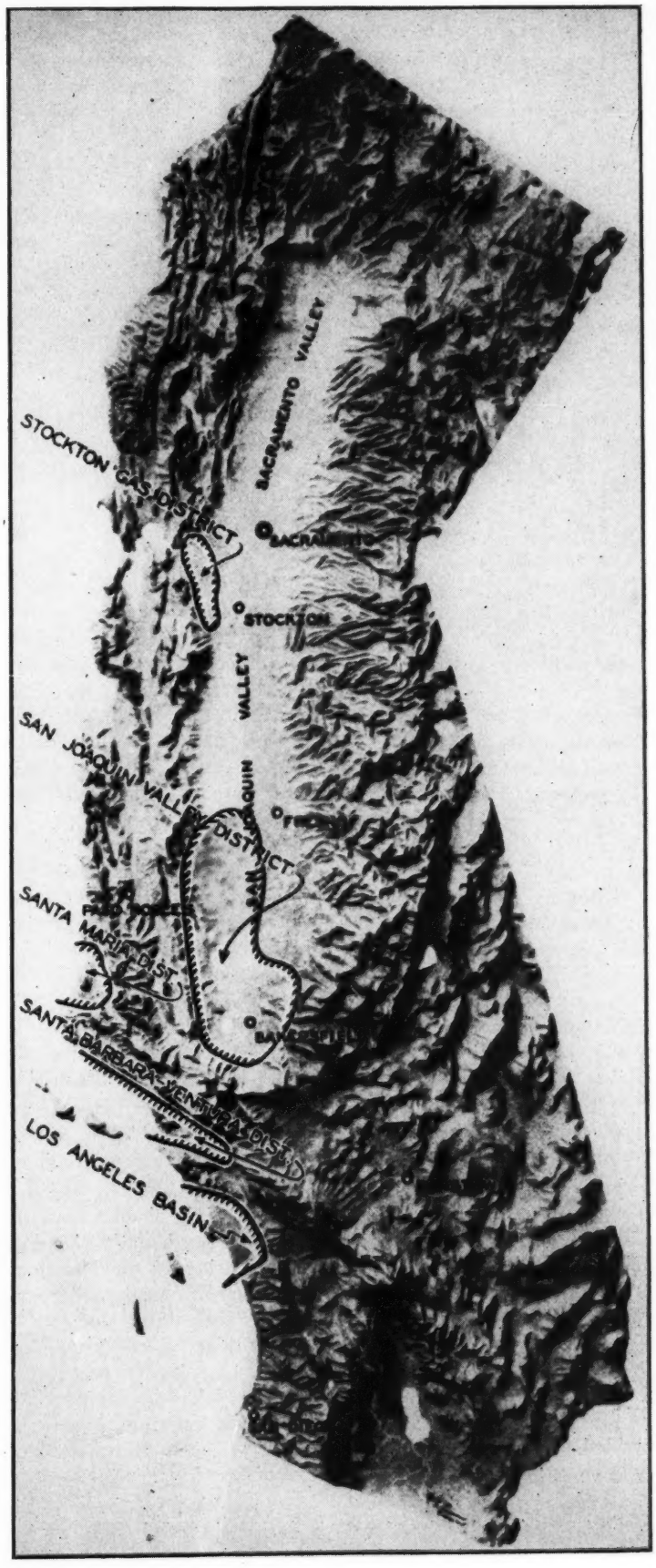
future possibilities. It is true that under present conditions and with our present knowledge, we are not very enthusiastic about the probabilities of a large part of those areas, but new techniques and new methods of exploration along with increases in demand and increases in price may change a possible but slightly probable area into one that is highly probable.

Production now is localized in four principle areas:

1. Coastal.
2. Santa Clara River Area from Newhall to Ventura Avenue.
3. Los Angeles Basin.
4. South half of the San Joaquin Valley.

There is still a great deal of territory within these areas that has not been condemned and must be considered prospective or potential oil territory. In addition, there is the whole north half of the San Joaquin Valley and the Sacramento Valley that is known to have gas producing horizons in it and may some day yield oil. The Salinas Basin has petroleum-bearing formations in it and may some day become a potential territory. Likewise, the Imperial Valley has not been entirely eliminated as potential oil territory. There are pretty definitely also large offshore deposits that cannot now be developed because of statutory regulations preventing drilling offshore.

In making an estimate of the discoverable oil, no attempt is made to break the amounts down into that discoverable from new fields and that discoverable from new horizons in old fields, although these things were considered in the deliberations of the geologists who took part in this survey. Neither was an attempt made to localize by districts



Relief model of California showing major oil-producing districts. While districts shown cover large geographic areas it must be kept in mind that the production within them comes from many comparatively small and widely distributed fields which aggregate but a fraction of the area delineated. Exploration remains active within the pictured districts as well as in California areas where production has not yet been found.

—Photo of relief map (copyright) by courtesy of H. A. Sedelmeyer, Berkeley, California.

or basins the amount of discoverable oil from new pools. However, this group feels that we have reason to believe that there are more than three billion barrels of oil to be found yet in California and that this oil will be found as our general store of information increases, our exploration techniques improve, demands increase, and other conditions favor the exploration.

Importance of Secondary Recovery

We next come to the second of the three major factors which will determine the future welfare of the producing division of the petroleum industry in California, namely, the factor of secondary recovery. Here again I wish to make clear that I am not reporting to you my personal viewpoint but rather the opinion of engineers and others eminently qualified to discuss this subject in the light of their every-day experience and work with this problem.

It is estimated on the basis of available sub-surface data that after depletion of all known California oil fields by present methods of production, not more than 25 per cent of the original oil content of the producing sands will have been recovered. California, to date, has produced approximately six billion barrels of crude and has an estimated future production from existing fields of over three billion barrels, making a total ultimate production of more than nine billion barrels.

Applying a 25 per cent recovery factor to this figure leaves a residual crude content of some 27 billion barrels in the ground. This appears to be an astronomical figure but even though the estimates are twenty to thirty per cent overstated, the resulting figures are still of tremendous proportions. A portion of this residual crude is available to us for production if we can devise ways and means of extracting it. Such is the problem of secondary recovery in California.

Diversified Approach to Problem

In some portions of the country, notably Pennsylvania, Kansas and Oklahoma, amazing results have been accomplished in the shallow fields by gas and air drive and water flooding methods. In many instances secondary recovery has equalled primary production. It is the purpose of California operators to utilize similar recovery methods in this State, modified to suit our peculiar conditions, and active preparations are in progress to accomplish this purpose. A careful study of the eastern methods offer many helpful suggestions but the sub-surface conditions are fundamentally different and little or no comparative data can be obtained which will enable us to predict with any degree of certainty the adaptability of these methods to our problem or the degree of success we may anticipate.

Fields successfully flooded have thus far been uniformly shallow with thin blanket type sands of relatively low permeability containing crude of relatively high gravity and low viscosity. California fields, on the contrary, are relatively deep with thick producing intervals containing strata of sands with widely varying permeability, although averaging much higher than eastern fields, and containing heavy asphaltic oil of very high viscosity. The problem of segregating sands of approximately uniform permeability and the response of a heavy oil to a water flood is yet to be determined. In addition, the expense of drilling deep input wells may be a serious deterrent to the success of the method.

One flood project is now under way in the Richfield Area of Orange County, and others are in immediate prospect.

Studies of the shallow areas of the State, and particularly those along the west side of the San Joaquin Valley, are not encouraging for water flooding methods due to the extremely high viscosity of the oil which makes its response to water flooding extremely doubtful. Here again, however, tests are proposed to determine the practical effectiveness of flooding.

Gas and air drives have been used in California with indifferent results. In the past the principal difficulty has been the non-uniformity of permeability which has caused gas to blow through from one area to another without doing the work of oil recovery. Serious attention is being given, however, to this problem and at least six projects on a small scale are now in operation in the State. Other experimental work, such as solvents and the application of heat to the reservoir itself, are being tried and serious consideration in several instances is being given to mining operations of the outcropping of bituminous sands. Out of this work will unquestionably come definite results.

Problem Not Wholly Technical

The principal problem in California, however, is not the technique of recovery but rather the problem of educating our producers and landowners to the desirability of such procedure and the necessity of unitized or cooperative work as a prerequisite to successful recovery methods.

Oil production in this State for the past twenty-five years has been on a highly competitive basis with most of our fields highly diversified in their surface ownership. All emphasis has been placed upon curtailment of production with little or no thought, except during the past few months, of increased recovery. Unless, and until our operators are fully conversant with this problem and are willing to throw into the pot their individual properties for the greater reward of increased recovery, little can be accomplished of a substantial nature.

If but a small percentage of the residual oil potentially available to us can be thus recovered, it is entirely possible that the future production of the State may be maintained for many years from this source, even though we do not greatly augment our reserves by new discoveries to the degree I have already suggested.

Possibilities Under Reservoir Repressuring

This brings us to the third factor, namely, extension of the productive

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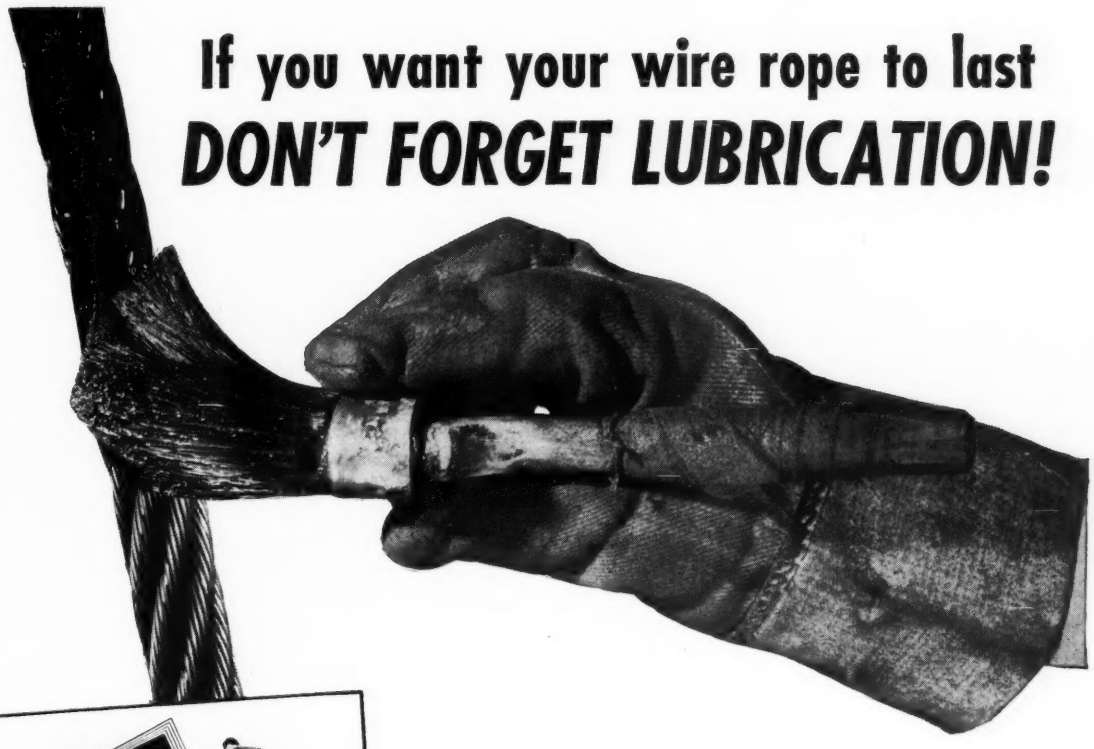

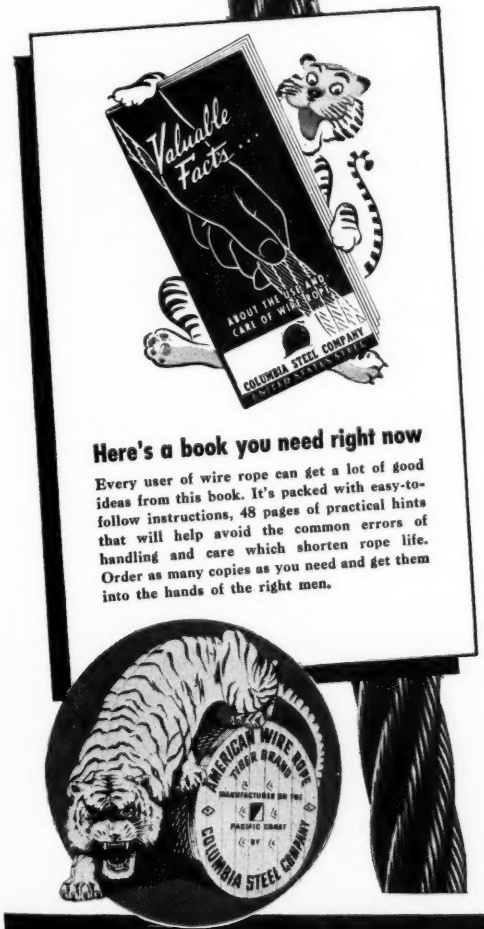

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life of known pools by means of reservoir repressuring. While a large amount of work has been undertaken in this field in California and the entire subject will be intensively explored in the years ahead, I wish to point out there is considerable difference of viewpoint on this subject and a wealth of material for persuasive argument in the hands of both the proponents of repressuring and those who are still skeptical as to its ultimate value.

In considering the application of repressuring to fields in California, I should like to direct attention to some of the difficulties encountered there that are not common in many other areas. When we consider repressuring in California, we, in some instances, are discussing the application of such a program to sands that are several thousand feet thick and are highly irregular from the standpoint of permeability. Sand thicknesses of this nature pose an entirely different problem than is encountered in structures where the pay horizon is relatively thin, as there is much less control over the sub-surface distribution of the repressuring agent.

One school of thought holds that even in those instances where repressuring extends the flowing life of a well, it would be highly problematical whether the ultimate recovery of the area subject to the operation is actually benefitted, their contention being that, except under conditions of close control, possible only in structures in which the oil sands are thin, large quantities of otherwise producible oil are likely to be by-passed by injected gas, resulting in an actual decrease in the field's ultimate recovery. Up to now, however, such differences of viewpoint have of necessity been restricted to the field of personal opinion and I do not believe there is anyone, at least in California, who is capable of saying with certainty which school of thought should prevail.

Extent of Repressuring Activity

Admittedly, the State has not been a leader in the development and application of repressuring principles, but there has been a considerable increase in such activity in recent years. Three pools are now under complete pressure maintenance; four are partly under pressure maintenance, and in seven other pools considerable quantities of gas and/or oil have been injected for storage purposes or for pressure maintenance over the past twenty years. Oil production in another pool was closed down last year and the structure set aside as a storage reservoir for gas.

In those fields where either complete or partial pressure maintenance projects are in effect, there has been too little experience from which to draw definite conclusions, although estimates would indicate beneficial results have been obtained.

We all can appreciate that in those instances where it can be shown, pressure maintenance will reduce materially the amount of drilling required to drain a structure effectively; that in these times resulting savings in material and man hours are of real importance. We also have a number of unusually deep fields in California in which it may be found that pressure maintenance would prove more economical than any other means of recovery once such fields have passed beyond the flowing stage.

These fields have high gravity oil and condensate existing under reservoir conditions of high pressures, temperatures, and sands of moderate to low permeabilities. Adoption of complete or partial pressure maintenance as a method of production is believed to offer a distinct advantage in such instances, since recovery of the hydrocarbons they contain is extremely difficult, if not impossible under normal methods of production.

Conservation a Primary Consideration

The difference of viewpoint which prevails over this matter of pressure maintenance in California centers around the factor of conservation, and it would seem that a great deal more actual operating experience will be necessary before there is likely to be any unanimity of opinion within the industry. Of necessity the application of repressuring principles to an oil structure requires an entirely new approach to the production of oil in that such a plan must contemplate unitized operations under conditions of careful control, irrespective of surface ownership.

Application of such a program in fields where surface ownership is widely distributed also poses a problem within itself. I can say to you very frankly that the industry in California would not be spending time, money, and materials on repressuring if such activity did not offer a chance for reward. At the present time, there is as much as 80,000 m.c.f. of gas per day being injected in various pools adaptable to some type of complete or partial pressure maintenance.

It is anticipated that, as a result of the work undertaken up to now and in progress, California's ultimate recovery will be benefited to the extent of from 200 to 300 million barrels of additional oil from those fields to which such a program might be applied. As we gain added experience and understanding, it is not unlikely that we may be able from time to time to report even greater opportunities being developed for us by work in this field which can readily result in doubling or trebling the additional oil to be recovered as indicated above.

Future Prospects Are Encouraging

To summarize the viewpoints of geologists and production engineers most familiar with today's exploration and production possibilities in California, it would appear we may anticipate the discovery of at least three billion barrels more oil reserves in California, computed on the basis of today's best known methods of production. It is to the development of secondary recovery methods, however, that we must look for our greatest contribution to the State's ultimate production of petroleum.

To take a current view, mainte-

(Continued on Page 20)

Some Tools and Methods Used in Cleaning Oil Wells in California

By G. B. Shea

(Conclusion)

Removal of Mud Sheaths
Washing-In Methods

When completing wells in California it is general practice to displace the mud fluid in the hole with water or oil, wash the perforations with one of the various pressure-perforation washers, and then bail and swab the hole if necessary. Several recent developments in washing-in methods have proved effective in hastening the completion of wells in California and in eliminating swabbing and bailing, thereby saving many hours of expensive labor. The introduction of natural gas under high pressure into the casinghead during swabbing to hasten the completion of wells has long been used by some operators in California.[27] Only recently the method has been used successfully in completing some wells in the Upper Terminal and Lower Terminal zones in the Wilmington field without the aid of swabbing. In wells that do not flow naturally after the mud fluid has been displaced with water or oil, gas at pressures up to 900 pounds per square inch is injected into the casinghead by means of a portable, high-pressure, low-volume compressor to displace the oil in the annulus between the casing and tubing and force the displaced fluid upward through the tubing to the wellhead. Ordinarily, in the two-zone completions in the Wilmington field, the Upper Terminal zone is open to the 8⅝-inch casing which serves as the flow string and the Lower Terminal zone is open to the bottom of 2½-inch tubing which is packed off from the casing. While the high-pressure gas is being injected into the annulus between the casing and tubing the packer is raised so that both zones are open to the incoming gas. Injected gas depresses the fluid level in the annulus to within several hundred feet of the bottom of the tubing, and when the injection pressure is equivalent to the pressure head of the column of oil the compressor is shut down. By means of a connection between the casing and the tubing at the wellhead the injected gas then is permitted to flow into the tubing at a slow rate and, as the pressure in the annulus declines, oil and gas from the formation enter the well. Control of the differential pressure between that in the formation and the wellhead is necessary to prevent movement of sand into the well. Further decline of pressure in the casing allows the fluid level to rise, and the column of oil gradually becomes sufficiently aerated to cause the well to flow. Nearly all of the wells completed in this manner flow naturally through the casing. If a well will not flow through the casing, gas is injected down tubing and upward through the column of oil in the annulus; this additional aeration usually causes the well to start flowing through the casing. After the well has "cleaned up," the casing is closed, and the well is flowed through the tubing. In two-zone completions both zones are flowed together for a short time before the packer is reset.

The compressor unit is a single stroke, two-stage, horizontal type driven by a 38-horsepower, multicylinder gas engine. Operating at 300 r. p. m. at an intake pressure of 50 pounds per square inch, the compressor has a normal capacity of 10,000 cubic feet of gas per 24 hours. The unit, including cooling tower and wet-gas scrubber, is mounted on a low-bed trailer with solid-rubber tires.

The use of this flexible system of completing wells has resulted in marked savings in completion costs as compared with conventional completion methods.

In new fields of the San Joaquin Valley, several operators have eliminated swabbing in completing deep wells by introducing oil and gas from nearby high-pressure wells into the tubing of the new well and displacing the column of mud fluid with a lighter column of oil and gas, thereby causing the well to flow.[28] Casing pressures in the wells are 1,500 to 3,400 pounds per square inch. After the liner is suspended in the hole, the tubing run, and the Christmas tree installed in the usual manner, water is pumped down the tubing and up the annulus between the liner and tubing, forcing the mud fluid out of the casing through the side outlet at the surface. Thus the weight of the heavier column of mud fluid is taken off the formation, and the mud fluid is salvaged for use in another well. Washing the hole is continued until the returns are clear water. Oil and gas from a nearby high-pressure well then are introduced with the water being pumped down the tubing. If the pressure of the oil and gas is sufficiently high, they are allowed to enter the discharge line of the water pump; otherwise the oil, gas and water are mixed before entering the pump. An initial mixture of 2 parts water and 1 part oil has been found to give best results. As the proportion of oil to water is gradually increased, the weight of the column of oil and water in the borehole decreases, and increased pressure is required to inject the fluid into the hole against the bottom-hole pressure. Pumping oil and gas down the tubing and up the annulus is continued until the formation pressure overcomes the fluid-column head and the well begins to flow by heads. When the well flows naturally the injection pumps are shut down.

The chief practical advantage of this method is the short time re-

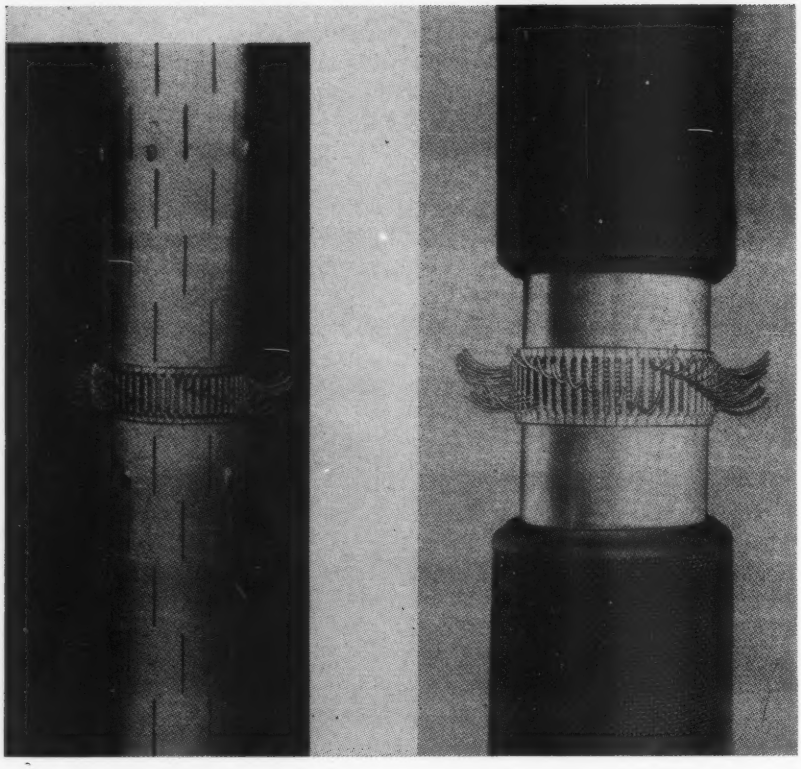

Figure 7—B. & W. wall-cleaning guide, showing mountings on a section of a slotted and a gravel-pack liner.

quired for bringing in the wells and for them to "clean-up" as compared with the conventional method of swabbing. It seldom takes more than 4 hours to displace the mud fluids and bring the well into production compared with the 1 to 4 days usually necessary to swab and clean up a well.

Wall Scraping and Washing

In low-pressure oil fields many operators remove mud sheaths from the face of productive sands by means of a Baker rotary wall scraper. The general procedure involves scraping the holes through the producing zones, setting liners, and then swabbing. Frequently the wells first are washed with one of the various types of pressure-or suction-type perforation washers and then bailed until no more clay and sand are removed. To an important degree, the success of the wall-scraping method depends upon circulation of a thin, colloidal mud fluid while the holes are being scraped to preclude replastering them with new clay deposits. When improperly conditioned mud fluids are used, mud sheaths may be removed from the sand faces temporarily, but by the time the scrapers are pulled from the holes and liners are run in, mud sheaths again may be formed on the walls of the holes. Under certain conditions some operators use oil as the circulating fluid when scraping mud sheaths with wall scrapers.

A recently developed method for removing mud sheaths in oil wells is known as the B and W completion method. The method involves the use of metal wall-cleaning guides and a special wash assembly. Mud sheaths are removed by a combination of abrasion and washing that mechanically breaks down the mud sheath and circulates the clay particles out of the hole while the liner is being installed in the well. Wall-cleaning guides are special collars with a large number of spring-steel wires mounted around the periphery Figure 7 shows wall-cleaning guide mountings on sections of slotted and gravel-packed liners. Ingenious mounting of the wires in the collar makes it possible to utilize torque action in each wire through an angle of 180° without permanent deformation of the wires. The outside diameter of the wire assembly generally is 1½ inches greater than the diameter of the hole, so that the curved parts of the wires are in contact with the wall of the hole when the liner is run into the well. Upward movement of the liner when the wire assembly is opposite the oil-bearing sand causes a scratching action of the spring wires against the mud sheaths and breaks them so that the clay particles can be circulated out of the hole. When liners are to be set opposite a thin sand, only one wall guide is required; for long, perforated liners and long liners with prepacked gravel screens, as many as 45 guides spaced 8 to 10 feet apart with a maximum spacing of 20 feet have been used.

By means of the wash-pipe assembly shown in figure 8, wash water is conducted to the lower end of liners or screens before the water enters the exterior annular space through the perforations. The wash-pipe assembly, including a perforated or gravel-packed liner, is run into the well on drill pipe or tubing; after it reaches bottom, circulation of drilling fluid is begun, and the liner is alternately raised and lowered until the up-and-down movement is slightly greater than the distance between the wall-cleaning guides. During the abrading-washing period, the circulating mud fluid is pumped out of the hole, and clean oil or water is used to complete the well. Circulation returns contain large lumps of clay and bit cuttings which, with a noticeable freeing of the liner in the hole as a result of elimination of wall friction, attests the efficiency of the method.

After the mud sheath has been scraped from the walls, a liner hanger is set by means of a setting tool released from the adapter. A steel ball then is dropped through

the drill pipe or tubing to a seat in the bottom assembly to confine the circulation of wash water through the perforations in the short nipple of the washing unit. Thus, during upward movement of the wash pipe the perforations or pores of the gravel pack are given a final cleaning.

The complete job usually requires 5 to 6 hours. Exceptionally good results have been obtained by this method of completing and cleaning wells. Besides obtaining higher initial production and uniform withdrawal of oil from the sand in most wells, the latter "clean up" quickly, and several days of swabbing and bailing are eliminated.

Chemical Methods

Chemical treatment of California wells for the removal of mud sheaths dates from the pioneer studies of Lake and Phelps, whose patent[29] (issued in 1924) relates to the introduction of acid into wells to destroy the colloidal properties of mud sheaths deposited on the walls. For a number of years acid corrosion of well casings when hydrochloric acid was used militated against extensive application of this method of treatment. With the disclosure in 1932 of the invention of Grebe and Sanford,[30] involving the use of an inhibitor that materially retards the action of hydrochloric acid on the surfaces of steel casing, interest in acidizing oil wells was renewed. In 1934 Bureau of Mines engineers directed attention to the possibilities of chemically removing mud sheaths from wells by adding small quantities of pulverized calcium carbonate (preferably limestone) to mud fluids before they are introduced into wells so that the resultant mud sheaths formed on the face of the producing sand would be susceptible to disintegration and removal by aqueous solutions of inhibited hydrochloric acid.[31] Since 1934 there has been considerable research and development in chemical methods for removing mud sheaths from the walls of wells, and a number of letters patent have been issued.[32]

Most of the patented methods are controlled by operating or service companies, and several service companies in California are equipped to treat wells chemically for the removal of mud sheaths. These companies maintain laboratories and engineering staffs to assist operators in preparing wells for chemical treatment and applying correct procedures for treating them successfully with chemicals.

Calcium Carbonate and Acid Treatment

For the past several years the calcium carbonate and acid treatment process of removing mud sheaths has been used successfully in many California fields. Comparisons have shown that for the most part initial productivity indexes of wells completed with mud fluids containing calcium carbonate and later acidized are higher than those of adjacent wells completed with ordinary mud fluid and conventional washing and swabbing. Sometimes the method apparently has not been successful, and Travers[33] points out that where acid treatment for mud-sheath removal seemingly fails, water blocking rather than deposited mud frequently is the primary cause of the reduced productivity.

Tests have shown that complete disintegration of mud sheaths by aqueous acid solutions (usually about 15 per cent hydrochloric acid by weight) occurs when the calcium carbonate content of the mud is about 15 to 20 per cent, based on dry solids. Most natural clays found in California do not contain this proportion of calcium carbonate. In general, clays obtained from desert deposits contain 5 to 10 per cent calcium carbonate, whereas hillside clays suitable for drilling fluids contain even less, and slough clays virtually lack this material. Thus in preparing a well for acid treatment the natural calcium carbonate content of the mud fluid governs the percentage of calcium carbonate to be added. The exact content of acid-soluble materials in the mud fluid is determined by laboratory analyses at

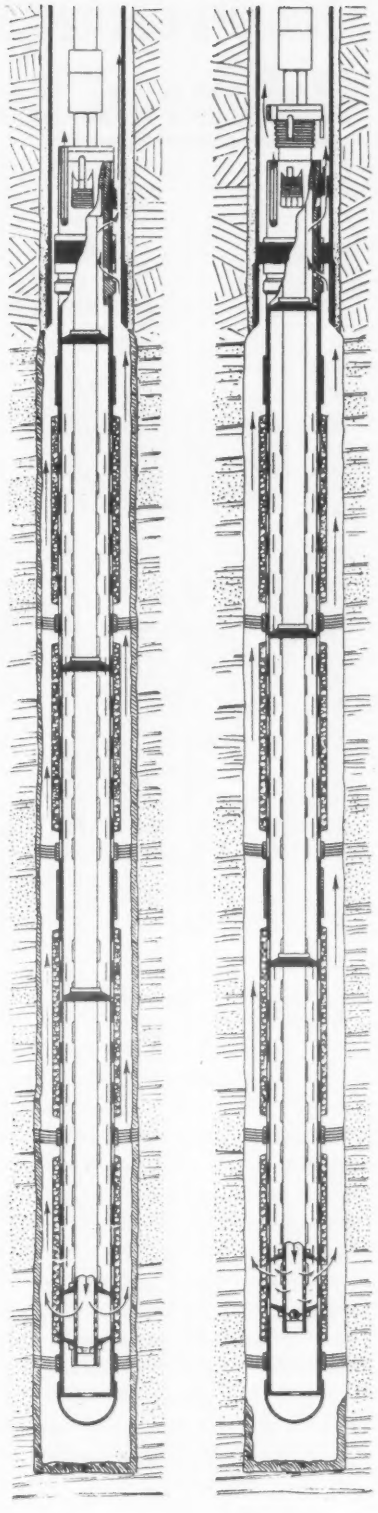

Figure 8—B. & W. well-completion method, showing wash-pipe assembly and wall-cleaning guides mounted on gravel pack liner.

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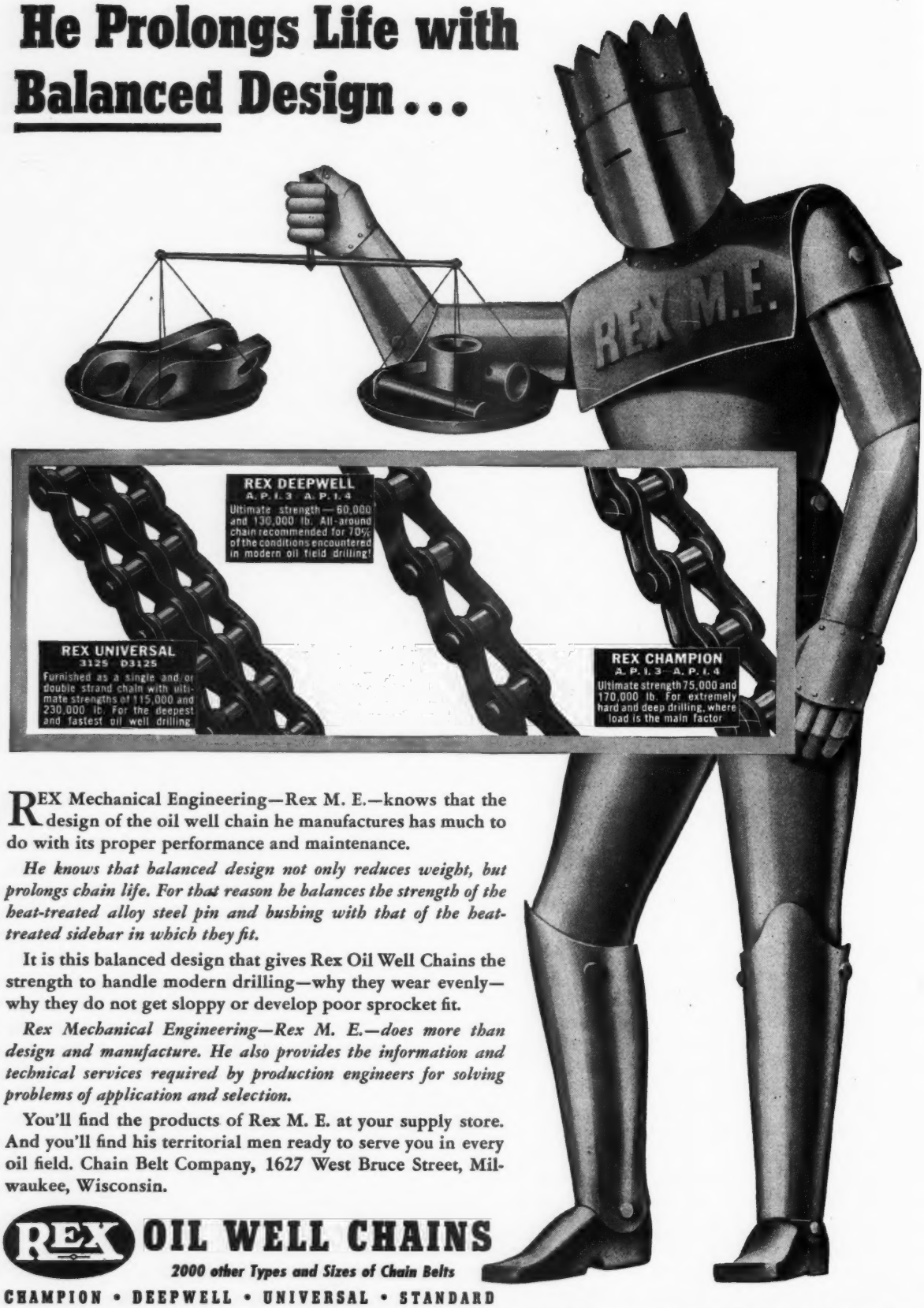
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the well by the service-company engineers. Where the natural calcium carbonate content of the mud fluid is too low for successful disintegration of mud sheaths by acid, pre-determined quantities of pulverized limestone are added to the mud stream, usually just before penetrating the oil zone. The maintenance of an adequate percentage of calcium carbonate in the mud fluid makes it possible to assure proper reaction of the acid and complete disintegration of the mud sheath when new wells are completed and when producing wells in low-pressure zones are redrilled or deepened. Many operators condition the mud fluid with calcium carbonate before drilling through upper zones that are to be "cased-off" so that at a later date when these zones are to be opened to production the hardened mud sheaths can be removed readily by acid treatment through gun-shot perforations.

Inhibitors for eliminating corrosion of the casing in no way impair the effectiveness of the reaction of the acid with the calcium carbonate. Sometimes wetting agents are added to the acid to facilitate penetration of the acid into mud sheaths that have become coated or impregnated with oil.

Kennelly[34] pointed out recently that where the hydrostatic pressure on the acid is slightly over 900 pounds per square inch the reaction

$$(2HCl+CaCO_3 \rightarrow CaCl_2+H_2O+CO_2)$$

takes place without evolution of the carbon dioxide gas, which remains in solution. For some time it was thought that the evolution of CO_2 gas aided in disintegrating the mud sheaths and that the evolution of gas was necessary for complete removal of the mud deposited on the sands in oil wells. Recent tests, however, have shown that the evolution of CO_2 is not necessary for complete disintegration of mud sheaths (even though it aids in the removal of mud sheaths in low-pressure wells).

Acidizing Technique

The technique of acidizing wells to remove mud sheaths containing calcium carbonate depends upon conditions in the well. Each well is an individual problem.

A common practice is to "spot" the acid in the liner by means of tubing to which a pressure-type perforation washer is attached. The purpose of the washer is to assure thorough agitation of the acid out through the perforations into the annulus behind the liner. Sometimes ordinary down-swabs are used to obtain the desired agitation of the acid, although they are not as positive as pressure washers in opening perforations.

A more recent method of acidizing, known as "rocking," has been very effective and is particularly adapted to the treatment of high-pressure wells. In this method tubing is run into the well, the Christmas tree is put in place, and the mud fluid in the hole is displaced with water until the fluid in the hole weighs approximately 63 to 64 pounds per cubic foot. The acid then is pumped down the tubing into the liner and displaced by clean water. Oil is sometimes used to displace the acid. Thus the heavier muddy water outside the tubing creates an unbalanced column that causes a back pressure to be exerted on the tubing. When the acid has been pumped into the liner, the pump is stopped, and the differential pressure between the heavier column of muddy water outside the tubing and the clean water or oil inside the tubing causes the acid to surge back into the tubing, displacing the water or oil into tank trucks. When approximately 20 cubic feet of water or oil has flowed into the tanks, it is pumped back into the well again, forcing the acid out of the liner. This procedure is repeated for 3 to 4 hours, causing the acid to be flushed back and forth through the perforations in the liner; the spent acid is then circulated out through the tubing to the sump and the well completed. The rocking method is much quicker than that in which the perforation washer is used, as it eliminates a round trip with the tubing and precludes the longer process of washing with the perforation washer.

Mud Acid Treatment

An important advancement in the art of cleaning wells was made in 1940, when Dowell, Inc., introduced Mud Acid for dissolving or disintegrating bentonitic drilling muds that contain no carbonates. Mud Acid is a specially prepared admixture of inhibited hydrochloric acid, sodium floride, and other reagents that greatly increase the solvent power of the acid to dissolve mud and clay-like materials. Inasmuch as the solid constituents of drilling fluids commonly consist of large quantities of bentonite or bentonitic clays, the resultant mud sheaths can be removed effectively by treating the wells with Mud Acid. An inhibitor is always used to minimize corrosion of the casing, and surface-tension-lower compounds and deemulsifying agents also may be added if necessary.

Usually Mud Acid is pumped into the well and allowed to remain in contact with the mud sheath only a few minutes as compared with several hours where ordinary inhibited acid is used. It is then followed with a water wash containing a surface-tension-reducing agent.

Acidizing to Clean Gun-Shot Perforations

Gun-shot perforations are often cleaned out by placing acid in the hole opposite the section to be perforated and then running in the gun perforator. Shooting is done in the acid so that the shot will carry some acid through the hole. After the casing is perforated a perforation washer usually is run in to agitate the fluid so as to force unspent acid from the hole into the shot holes. This method has proved to be effective for removing cement or mud from behind gun-shot-perforated casing.

Conclusion

The importance of thorough cleaning of wells cannot be overemphasized. To obtain successful results, it is essential to apply proper clean-out methods, based on the kind and

location of the accumulations in wells. Many failures to obtain satisfactory increases in oil-production rates may be ascribed to misapplication of tools or methods or to application of orthodox procedures that are not suitable for correcting existing conditions. Futhermore, no single tool or method can remedy conditions in all wells. Experience has shown that good results are obtained in some wells, whereas in others use of the same tool or application of the same procedure to overcome a comparable condition proves ineffective. Application of combinations of methods often is successful, and in many wells success is attained only after several methods have been tried.

Furthermore, the application of systematic clean-out methods when the need is indicated makes it possible to obtain better understanding of the characteristics of wells and thereby obtain maximum recovery.

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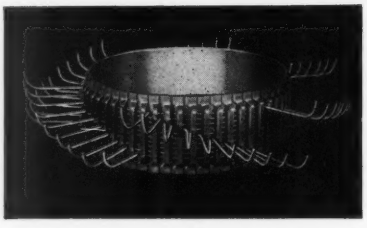
Buy Bonds

MAXIMUM PRODUCTION
Assured by Mud Removal with B & W Completion Method

THIS METHOD accomplishes positive mud removal when setting production liners—either gravel-packed or perforated. The essential part of the process is the use of....

B and W, Inc.

WALL CLEANING GUIDES



One trip into the hole lands liner, removes mud behind liner, washes gravel pack or perforations, and prepares well for production.

Bailing and Swabbing Greatly Reduced...

No costly bailing period for pumping wells—and a very short swabbing period for flowing wells. In one recent case a well was brought in by the B and W Completion Method after only seven hours of swabbing, while an offset well using conventional methods required over four days.

Wells Clean Up Quickly...

There is a quick change from wash fluid to clean, mud-free oil when the B and W Completion Method is used.

WRITE OR PHONE FOR INFORMATION

Contact your nearest B and W Office for full details on this time-saving and money-saving completion method.

BRUCE BARKIS — B and W, Inc. — KENNETH WRIGHT

WEST COAST
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Well Completion Specialists
Makers of
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NELSON PRE-PACKED GRAVEL LINERS • WILLIS ROTARY CHOKES

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TEXAS

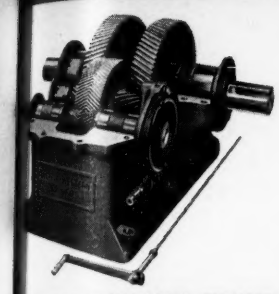
G. E. Advances A. C. Sanger

Of interest to his many West Coast friends, is the recent appointment of Alfred C. Sanger as national sales manager for the Appliance Divisions of General Electric Company's Appliance and Merchandise Department, with headquarters at Bridgeport, Connecticut.

Previous to his promotion, Mr. Sanger was manager of small appliances and heating devices for G. E., supervising factory operations which included the General Electric factory at Ontario, California, which, like all other of the company's plants, is now engaged entirely in war work.

Mr. Sanger is well known on the Pacific Coast. His brother and family live in Los Angeles. Very recently he visited the General Electric Works in Ontario, when the Navy "E" Award was presented to them.

PACIFIC
OILFIELD EQUIPMENT



CIFIC-WESTERN SPEED REDUCER

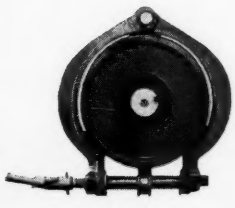
PACIFIC TYPE C PUMPING UNIT

PACIFIC CRANK COUNTERBALANCE

PACIFIC TYPE BC PUMPING UNIT

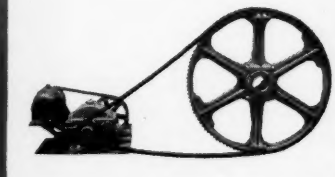
Oil Field Operators look to Pacific-Western, one of the largest precision manufacturers in the West, for the reliable and efficient Pacific pumping units, herringbone speed reducers and bandwheel drives.

The Petroleum Industry draws on our engineering and manufacturing facilities for all types of gear requirements. We invite your inquiry. Send us your specifications.

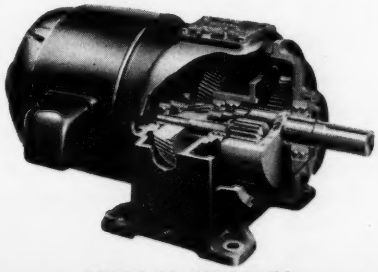


PACIFIC SAFETY BRAKE

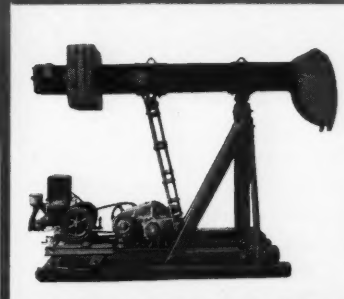
TYPE B PUMPING UNIT



PACIFIC BANDWHEEL DRIVE



PACIFIC-GE. GEARMOTOR



PACIFIC TIMBER PUMPING UNIT

WESTERN GEAR WORKS

COMMERCIAL OFFICES AT: 11181 LONG BEACH BLVD., LYNWOOD, CALIF.

PLANTS: SEATTLE, LYNWOOD, VERNON, SAN FRANCISCO

California Oil Future Outlined

(Continued from Page 12)

nance of the present rate of production in California would exhaust the State's known reserves in ten years, provided it were possible to crowd the productive life of existing wells into so short a period. We all know, however, the effect of the law of diminishing returns on oil well operations and that it will take many years to deplete the present economic sources of production. Therefore, the extent to which California's petroleum supplies will be imperiled by abnormal wartime production rates will be determined only by the length of the conflict and the required intensity of production efforts.

For my part, I have complete faith in the ability of our industry to devise ways and means of prolonging the life of our California oil resources far beyond the indicated ten-year supply remaining. I am willing to hazard a guess that California fields will be the primary source of supply for the Pacific Coast territory for at least thirty and perhaps fifty years to come, provided the dictates of good judgment are used by those in authority who set the prices this industry receives for its goods and services.

I make such a prediction only because I have complete faith in the ability of free enterprise to solve the problems if given the tools to work with.

R. E. Foss Advanced By Barnsdall

W. C. Whaley, Vice President of Barnsdall Oil Company, announces the appointment of R. E. Foss as General Superintendent of operations in the California Division.

During the time Mr. Foss has been affiliated with Barnsdall he has held the position of Production Foreman, Engineer in charge of construction work, and at the time of his appointment as General Superintendent he was Chief Engineer of the Drilling Department.

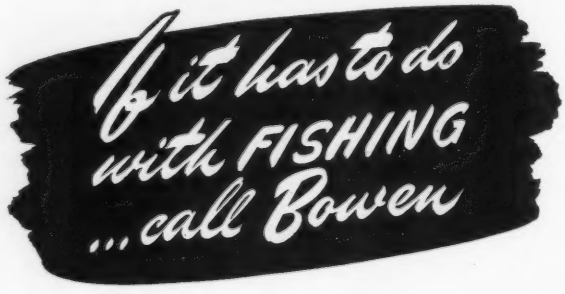
Mosbacker Joins Rapid Blueprint Co.

Vincent L. Mosbacher joins the Sales Division of the Rapid Blueprint Company and will specialize in solving the reproduction problems of the technical departments of the oil companies.

This company's marked development has been due to the remarkable concentration of oil companies in the city of Los Angeles and their insistent demand for all kinds of difficult reproduction. It possesses and uses to advantage the largest photographic lens in the country with which it makes negatives in one piece 40 in. x 96 in. at the same scale as the original map.

For the past 13½ years Mr. Mosbacher has been Chief Draftsman for the Conservation Committee of California Oil Producers and prior to that was three years with the Shell Oil Company in the Survey and Drafting Department.

Mr. Mosbacher is a Past President of the Chief Draftsmans Oil Map Revision Association and his many friends in the California oil industry wish him well in his new work.



For **any** problem involving fishing operations, Bowen has the tools and service facilities instantly ready for your phone call—**in all active California fields!**

Five service stores, located with an eye to maximum convenience no matter where you operate, are fully stocked and manned to serve you—any hour of the day or night. And . . . Bowen Tools carry the same famous operating and safety features as always to insure you complete dependability on any job you tackle.

Next time, remember—**call Bowen!**

BOWEN FISHING TOOL CO.

SPERRY-SUN

SPERRY-SUN

Leader in Its Field

Since the discovery of the first oil well there have been many important production developments — among which Surveying Devices and Services mentioned below are recognized as outstanding contributions to the industry.

SURWEL Clinograph	H-K Single Shot
SYFO Clinograph	M-M-O Bottom Hole Orientation
E-C Inclinometer	K-K Whipstock
H-K Inclinometer	Polar Core Orientation

SPERRY-SUN WELL SURVEYING CO.

PHILADELPHIA, PA.

HOUSTON, TEXAS LONG BEACH, CALIF.

THIS LAUGH

OFF!!

The minister had called on the widow to offer his condolences.

"That you have the sympathy of all the village should be some comfort to you," he murmured, "and you know to whom to turn for consolation."

"Yes," she said, between her sobs, "but I don't think he'll marry me with three children."

What's that ugly insignia on the side of the bomber?

Sh-h-h. That's the commanding officer looking out of the window.

A lady as proud as old Lucifer
Is tired of her husband's abucifer.
She says she will see,
If she ever gets free,
Love doesn't again make a gucifer.

"You should take a bath before you retire."

"But, Doc, I don't expect to retire for another 20 years."

How old would a person be who was born in 1894?

Man or woman?

Mother: "Now, Junior, be a good boy and say 'ah-h-h,' so the doctor can get his finger out of your mouth."

Papa loved mama,
Mama loved men;
Mama's in the graveyard,
Papa's in the pen.

First soldier (regaling a group of girls with an exaggerated account of his part in capturing a small town): "Then an explosion tore up the main street."

Girls: "Goodness! And what did you do?"

Second soldier: "He tore up a side street."

"Why do people say 'as smart as a steel trap'?" asked the talkative boarder. "I never could see anything particularly smart about a steel trap."

"A steel trap is smart," explained an elderly person in his sweet voice, "because it knows just exactly the right time to shut up."

Doctor: Only members of the family may see him. Are you a relative?

Girl: Oh, yes indeed. I'm his sister.

Doctor: So glad to meet you. I'm his father.

"You sold me a car two weeks ago."

"Yes sir."

"Tell me again all you told me about it then. I'm getting discouraged."

"There are three sizes in womens sweaters. Too large, too small, and oh my goodness."

"Father: "Did I hear the clock strike three when you came in this morning, son?"

Son: "Yes, Dad. It was going to strike 11, but I stopped it so it wouldn't wake you up."

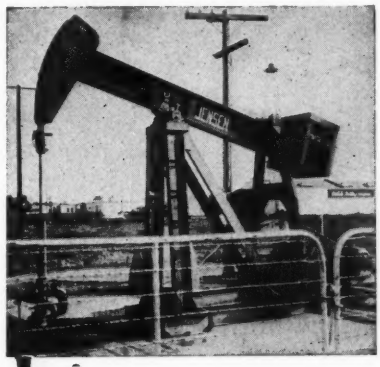
Gradma says that in her youth the girls never thought of doing the things they are doing now, and then she added wistfully, "And that's why we didn't do them!"

Gaby: "Have you heard the story about Goldylocks and her hangover?"

"Lucy: "No, how does it go?"

Gaby: "It starts like this: 'Once upon a time there were three buyers . . .'"

Said a small boy: "My maw and my paw they had an awful time getting married. Maw wouldn't marry paw when he was drunk, and paw wouldn't marry maw when he was sober."



It Took 25 Years!

Field men, engineers and mechanics, pooling their ideas on pumping equipment, have finally developed and perfected the JENSEN Unit now so popular from coast to coast and Gulf to Great Lakes.

It took 25 years! Good equipment, like the California redwood, grows slowly. There is no substitute for time.

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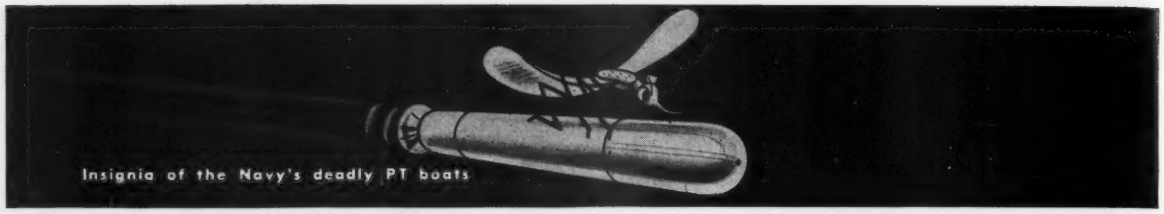
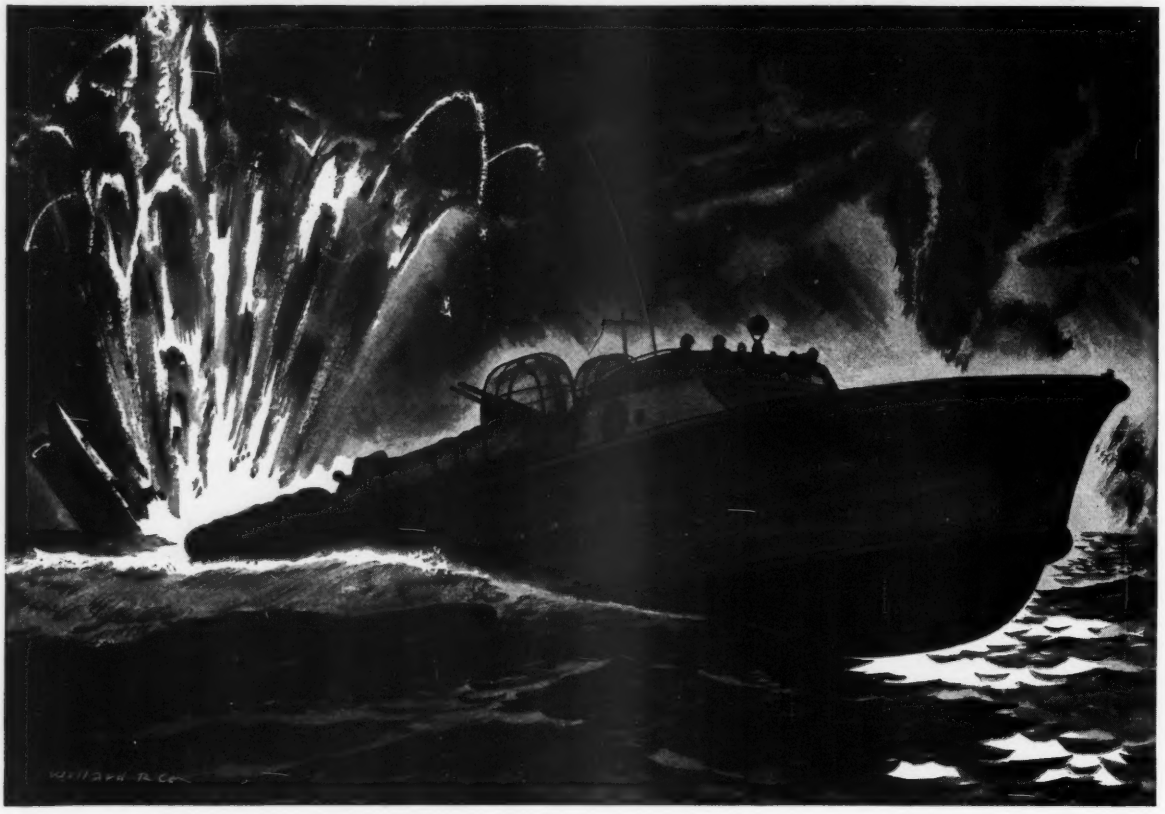




What makes a mosquito buzz?

Muffled motors roar suddenly as the PT boat starts her sprint. Almost before tracers arch from the enemy cruiser, the Yankee Mosquito knifes in, lays her long, lethal egg and bounces away at a wide open 70 knots. Scratch another Nip cruiser.

Such hit and run fighting demands motors that don't miss. They must hum flawlessly to take a 77-foot cockle shell under enemy guns. And PT motors *don't* miss—RPM DELO helps guarantee that.

Developed to solve the special problems of Diesel lubrication, RPM DELO ends the danger of stuck rings. It actually cleans motors gummed by other oils. RPM DELO's special additives guard bearings against corrosion, minimize sludge, cut wear to a fraction.

If you're interested in slicing repairs as much as 50%, in doubling the time between Diesel overhauls, remember the lubricant that helps make the Navy's Mosquito boats buzz—switch to RPM DELO

STANDARD OIL COMPANY OF CALIFORNIA

September Meeting A. I. M. E. Junior Members

Approximately thirty members and guests of the Southern California Junior A.I.M.E. convened on September 9 in Huntington Park for the organization's monthly dinner meeting. As a departure from the routine type of meeting, a program consisting of impromptu questions—directed from the audience to a "Board of Review"—was instituted. Serving on the board were five prominent members or ex-members of the Junior chapter; T. A. Atkinson, General Petroleum Corporation; E. C. Babson and J. E. Sherborne, Union Oil Company; Jan Law, Dominguez Oil Fields Company; and E. G. Trostel, Office of the PAW.

Among those topics commented upon by the board, and discussed in general by the group, were the following: "Methods of computing oil reserves and their applications", "If, in an oil field, well spacing cannot be evaluated, to what extent can reserves be estimated?" "Merits of high speed, light weight drilling as opposed to slower, heavy weight drilling;" "Magnitude, extent, and effect of oil field faults;" "Well spacing for water flooding projects;" and "When should water flooding be instituted?" With reference to the latter two topics the group was fortunate in having in attendance Professor Clark F. Barb of the Colorado School of Mines. Mr. Barb ably discussed phases of water flooding as practiced in the Bradford Field and answered questions relating to various aspects of secondary recovery.

Group interest and participation in the meeting was sufficiently high to denote conclusively the need and value of such a program. Similar programs will be instituted from time to time.

In conclusion, Chairman Turner announced that, due to the October general meetings, the next Junior meeting will be deferred to November.

Mabel A. Green Joins Waves

Miss Mabel A. Green, Editor of "Let's Get Associated", dealer publication of Tide Water Associated Oil Company has been accepted as an officer candidate in the Women's Reserve of the United States Naval Reserve.

Wm. R. Argyle Joins P. A. W.

Appointment of William R. Argyle as Assistant Director of the Refining Division was announced on September 20 by the Petroleum Administration for War.

Mr. Argyle is on leave of absence as Assistant Manager of Refining of the Sinclair Refining Company, with headquarters at Marcus Hook, Pa.

A native of Utah, Mr. Argyle received his early education in that state and was graduated from the University of Utah in 1915 with a B. S. degree. Soon after graduation he joined the staff of the U. S. Bureau of Mines, where he served as an assistant physicist until 1920.

In June, 1920, Mr. Argyle joined the staff of the Sinclair Refining Company as a fuel engineer. Four years later he was appointed Refinery Superintendent, a position he held until recently, when he was promoted to Assistant Manager of Refining.

He is married and has three daughers. He resides in Swarthmore, Pa.

Commenting upon the appointment, Deputy Administrator Ralph K. Davies said:

"The PAW is fortunate in obtaining the services of Mr. Argyle, who is recognized as one of the country's outstanding refiners. His knowledge and experience will play an important part in coordinating the production efforts of the Nation's refineries with military and civilian needs."

Albert R. Zelt Advanced by Oil Well

Election of Albert R. Zelt of Oil City, Pa., as ranking vice president of the Oil Well Supply Company, U. S. Steel subsidiary, was announced on Sept. 30th. Mr. Zelt's election occured at a recent meeting of the Board of Directors of the Company.

Formerly vice president of Oil Well Supply Company in charge of manufacturing, Mr. Zelt's promotion is the second such announcement for the concern in recent weeks

The ranking vice president of Oil Well Supply Company is 43 years old, having been born in Washington, Pa., February 28, 1900. He attended grade school and high school at Washington High School in that city, and was graduated from Carnegie Institute of Technology in Industrial Engineering and Mechanical Engineering in 1923.

Mr. Zelt was employed as engineer in efficiency in the engineering department of the American Rolling Mills in 1923 in 1925, he entered the transportation business in Pittsburgh, eventually becoming vice president of the Pittsburgh Transportation Company.

In 1931 he became manager of the service department of Oil Well Supply Company with headquarters at Oil City, Pa. Shortly thereafter he was made Works Manager, and in 1941 was elected vice president in charge of manufacturing.

He is married and has two children, a boy of 15 and a girl of 11. He will make his future home at Dallas, where headquarters of the Oil Well Supply Company are located. Mr. Zelt is chairman of the Rotary Drilling Machinery Manufacturers' Committee of the American Petroleum Institute.

The National Supply Company Announces Personnel Changes

R. W. Gordon, Division Manager of the Texas Division, assumed the duties of Manager of Oil Field Sales with headquarters at Toledo, Ohio, on October 1. Mr. Gordon has been affiliated with The National Supply Company since 1917 and formerly served as Division Sales Manager of National's Mid-Continent organization at Tulsa.

James M. Thompson, Texas Tubular Manager at Fort Worth, succeeds Mr. Gordon as Division Manager of the Texas Division. Mr. Thompson affiliated with National in 1940 following a tenure of six years of service with the Norvell Wilder Supply Company as their representative in Texas and Oklahoma.

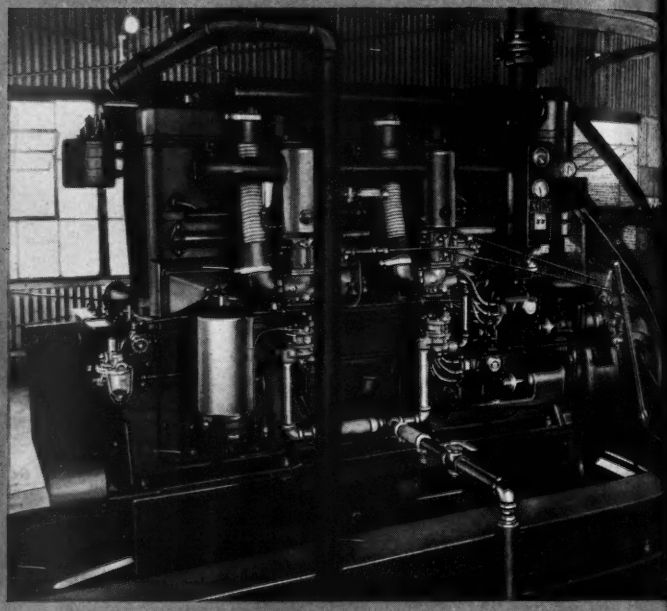
TAKE THE KINKS OUT OF YOUR

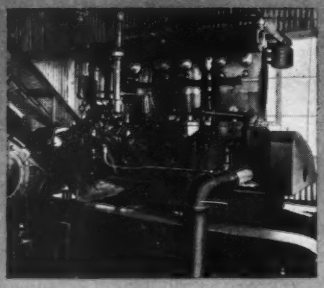
Pipe Line Power Problems

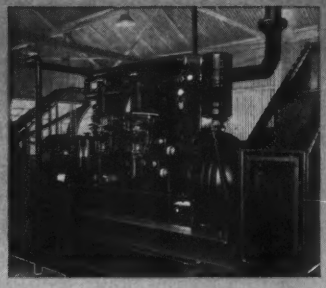
BY INSTALLING

Climax

PIPE LINE PUMPING ENGINES







Climax Pipe Line Pumping Engines are a sound, long-term investment for driving pumps in pipe line stations.

Quick starting, dependable operation and negligible maintenance cost since installation are reported for these R6I Climax Engines used on the pipe line of an internationally known oil company.

THEY ARE QUICKLY INSTALLED—and furnished completely equipped for the particular requirements of the drive.

THEY GIVE UNFAILING OPERATION—The ability to run on a variety of fuels—natural gas, butane or gasoline—insures continuous operation. Dual ignition, two spark plugs per cylinder, provide highest power output and smooth effortless performance.

THEY STAND UP UNDER HEAVY CONTINUOUS LOADING — encountered in pipe line service.

THEY ARE EASY TO OPERATE AND MAINTAIN — Climax Engines are simply made, easy to run, and can be maintained by regular field mechanics without special training.

WRITE TODAY *to Climax Engineering Company, Clinton, Iowa, or to the distributors below for full details on engine types and sizes available.*

"For High Achievement in the Production of War Material"

ARMY NAVY

Climax Engineering Company

GENERAL OFFICES & FACTORY:

CLINTON, IOWA

REGIONAL OFFICES: CHICAGO, ILL., DALLAS, TEXAS

Distributed in the Mid-Continent by

THE CONTINENTAL SUPPLY COMPANY

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CLIMAX ENGINES & PARTS CO.

1406 S. Grand Avenue, Los Angeles, California

Field Development

Los Angeles Basin

Huntington Beach Town Lot Booms

A drilling boom of no mean proportions is currently underway in the old Town Lot area of this field. While many of the projects are redrills to the Tar zone their number makes quite an impressive list. A few of those all ready started are C. W. Camp Lambert No. 1, Ernie Combs Jr. Joyce No. 1, Compton Oil Co. Well No. 1, Tim Oil Co. Bundy No. 10 and several others in various stages of preparation.

Wells are being drilled into Jones sand in the offshore pool by Beloil Corp., Huntington State Co., Southwest Exploration Co., Standard Oil Co. and Wilshire Oil Co.

Texaco Spuds Deep Test

The long awaited deep test of the Long Beach field is at last under way. The Texas Co. spudded its Field No. D-1 on September 28th. and hole is now being drilled ahead below 2000 ft. with an 8½" bit after cementing 9⅝" casing at 706 ft. Hole is going down northwest from the intersection of Spring and California Sts.

Potrero Test Getting Deep

Basin Oil Co. Potrero No. 14, deep test well in the old Potrero field, is coring ahead in steeply dipping shale at 9200 ft. Well is located in sec. 34-2s-14w southwest of the Potrero Country Club's club house.

Redondo Area Continues Brisk

Development of the northerly extension of the old Torrance field continues at a steady pace. There are 6 strings of tools running continously with enough locations ahead to make it about a six months program. LeBow and McNee have 1 string going and 5 locations prepared, Dumm Bros. have 1 rig and and 1 location, Royal Pet. Co. has 1 string and 6 locations, St. Francis Oil Co. has 1 string and 1 location with Wood-Callahan Oil Co. having the same strings. Other operators in the area are Commando Oil Co., Geo. D. Nordenholt and The Texas Co.

Wilmington Field Continues Active

This field continues to be one of the most active in the state. During the current week there were 18 string of tools running and 5 wells were placed on production. Initial production for these 5 wells was slightly in excess of 1000 barrels per day.

Del Valle Outpost Shows Promise

Bankline Oil Co. Sterry No. 101, northerly outpost well at the west end of the Del Valle field, is coring ahead in gray sand at 4600 ft. A 45 minute formation test was made of several streaks of oil sand in the interval 4460 ft. to 4495 ft. which blew gas at an estimated rate of 750 MCF per day. Fluid recovery consisted of 500 ft. of 24 gravity oil and 210 ft. of oily mud. Operator has released no information as to this zones position in the section.

Herley Kelley's Orduno No. 1 is being rigged for an open hole pumping test of the zone from 4885 ft. to 4992 ft. Still farther to the west, sec. 13-4n-18w, this operator has location graded for Black No. 1.

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Aliso Canyon	Barnsdall-Bandini Pet. Co., Roosa	1	29, 3-16		Grading roads
	Standard Oil Co., Frew	1-1	29, 3-16	5621	Drilling
	Standard Oil Co., Del-Aliso	1	29, 3-16		Location
Del Valle	Standard Oil Co., N.L. & F.	3-1	19, 4-17	5939	Reaming
Las Llajas	Western Gulf Oil Co., Brady	1	13, 3-17	9807	Abandoning
Newhall	P. M. Girard, Fisher-Wosk	1	6, 3-16	7309	Drilling
Norwalk	Gen. Pet. Corp., H. B. Allen	1	12, 3-12	6817	Drilling
Puente	Horace Steele, Opr., Kenwood	1	17, 2-10	3993	Drilling
	J. C. Drilling Co., Kelso	1	12, 2-10	3194	Repairing
	V. & F. Oil Co., Grazide	1	27, 2-10		Location
Rice Canyon	General Pet. Corp., Mendota	1	22, 3-16	6117	Drilling
	Sylmar Richfield Oil Corp., T.I.T.	1	19, 3-15		Location
Temescal	The Texas Co., Dominguez	57-1	1, 4-18	6940	Drilling
Whittier	H. & C. Oil Co., Joyce	1	22, 2-11	5825	Idle
	Orange County				
Greenville	P. M. Girard, Mark Fisher	1	27, 5-10	5655	Redrilling
Newport Beach	Signal Oil & Gas Co., Banning	2	20, 6-10	1810	Drilling
	San Bernardino County				
Chino	Chino Hills Oil Co., Kraemer	1	33, 3-28		Location

Norwalk Test Getting Deep

General Petroleum Corp. continues to prospect ahead in its H. B. Allen No. 1. The hole is currently being drilled and spot cored below 6800 ft. While no information is being released by the operator it is understood that the formation has been largely shale below 5600 ft. Try is located on sec. 12-3s-12w, about 2 miles northwest of the town of Norwalk.

Mark Fisher Redrilling

P. M. Girard is redrilling his Mark Fisher No. 1 on sec. 27-5s-10w, north of the town of Fairview. Hole was originally bottomed in Basalt at 5655 ft. after having cored 10 ft. of silty oil sand at 4600 ft. The hole was plugged and a whipstock set at 1328 ft. to direct hole to the east. They are now redrilling in hard Pico shale with streaks of shell below 3700 ft.

Standard Oil Co. Prepares For Test

Standard Oil Company Gough No. 13, shallow gas test in the old El Segundo field, has been bottomed in shale and gray sand at 4308 ft. All tests run below 3000 ft. showed considerable gas but also large quantities of salt water. Hole has now been plugged and bridged to 2799 ft. where 5½" casing is now standing cemented. Operator will clean out and attempt to place well on production from the interval 2799 ft. to 2900 ft.

Newport Beach Test Spudded

Signal Oil and Gas Company No. 2 spudded September 18 and is now drilling below 1800 ft. Test is located west of the Newport Mesa Bluff in sec. 20-6s-10w, approximately 900 ft. northeast of Banning No. 1 which is currently pumping about 20 barrels per day of clean oil.

Puente Hills Well Cores Oil Sand

Horace Steele is fishing for stuck drill pipe in his Kenwood No. 1 after reaching 3993 ft. in shale. Located about 2 miles southeast of the town of Puente in section 17-2s-10w hole has been cored almost continually below 2500 ft. A little oil sand was cored at 3200 ft. and the cores from 3640 ft. to 3731 ft. were approximately 60% good oil sand. Cores from 3731 ft. to 3741 ft. recovered shale with streaks of grayish oil sand.

Rice Canyon Well Gets Showing

General Petroleum Corp. Mendota No. 1 located in section 22-3n-16w is directionally drilling in hard shale at 6120 ft. Cores taken between 5175 ft. and 5988 ft. recovered shale with streaks of gray sand and oil sand. The oil sand is reported as showing a good cut and odor.

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Coastal District

Ojai Field Gets Test

Richfield Oil Corp. is giving this old field another test. Ojai No. 48 located on sec. 12-4n-22w was spudded September 27th and is now being cored ahead in silty oil sand below 700 ft. Objective depth is approximately 1500 ft.

Oxnard Area Becomes Active

The long dormant Oxnard field is about to become active again. Three tests are slated to get under way in the near future. Rig has been built for Edward F. Delaney Todd No. 1 and for Exeter Oil Co. Lenox No. 2 in section 6-1n-21w while Hub City Pet. has made technical spud for their Chase No. 1 in the same section.

Torrey Canyon Test Plugged Back

Union Oil Co. Torrey No. 60 deep test in the old Torrey Canyon field is plugging back and testing by stages. Located in the center of the old producing area on sec. 5-3n-18w, hole was drilled and cored to the total depth of 6146 ft. No showings were encountered in the lower reaches of the hole. Operator is now perforating and testing by stages the old producing zones.

Ventura Avenue Completion

General Petroleum Corp. Barnard No. 27 was completed September 27th for an initial production of 1872 barrels per day of 31 gravity oil. Total depth 9786 ft. with 6⅝" casing shut off at 8906 ft. The Tide Water Associated Oil Co. Hartman No. 29 is rapidly reaching the completion stage and is currently coring ahead below 10,700 ft. thru 9⅝" casing cemented at 7567 ft. Shell Oil Co. Inc. has announced locations for two extension tests on its Taylor lease, one will be on the north flank and one on the south flank of the field.

Yolo County Cats Abandoned

The Texas Company Winchester Lake Six No. 1 has been abandoned after drilling and coring to a depth of 5416 ft. Located in section 20-7n-4e well found no showings worthy of a test in either the Eocene or Cretaceous. In the Dixon area Shell Oil Company, Inc. has abandoned its Glide No. 1 section 15-7n-3e at the depth 6696 ft. There were no showings encountered and no tests were made.

Glenn County Test Has Blowout

Superior Oil Company is drilling ahead in its Glenn Comm. Three No. 72-20 below 6400 ft. after controlling a short blow out. While drilling ahead below 6100 ft. the mud became badly cut with fresh water and gas and the well blew a small amount of mud and water before being brought under control. It is reported that 2000 sacks of Baroid was added to the mud before drilling was resumed. Well is located on sec. 31-21n-1w southeast from operators recent no dope gas well Knight No. 1.

Santa Rosa Well Abandoned

The Texas Co. Petan Investment Co. No. 1 was abandoned in hard Cretaceous shale at 1743 ft. Hole was drilled in the Santa Rosa area of Santa Barbara County on section 20-6n-32w.

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Casmalia	O. C. Field Gas. Corp., Casmite	2	13, 9-35	1900	Pumping
Lompoc	Alphonzo E. Bell Corp., Lompoc	7	28, 8-34	4516	Suspended
Los Olivos	Hub Cl Co , La Laguna	1	7, 7-30	3594	Drilling
Purisima Hills	Whittier Assoc., Barham	1	11, 7-32	4847	Rigging pump
Santa Rosa	The Texas Co., Petan Inv.	1	20, 6-32	1743	Abandoned
Tinaquaic	Union Oil Co., Sisquoc C. H.	5	18, 9-31	1928	Abandoning
	Ventura County				
Bardsdale	Camarillo Oil Co., Camarillo	2	32, 2-20	1509	Drilling
Conejo	Allied Ppty, Inc., Camarillo	2	4, 1-20	123	Abandoned
	Sulphur Springs Oil Co., Janss	1	23, 2-19	4598	Cleaning out
Del Valle	Herley-Kelley, Black	1	13, 4-18		Grade
Eureka Canyon	El Rika Oil Co , Well	5	33, 4-18	428	Pumping
Fillmore	Standard O. Co., Fillmore Comm.	2-1	24, 4-20	8368	Drilling
Happy Camp	Cal Camp Oil Corp., Harrington	1	21, 3-19		Location
Ojai	Richfield Oil Corp., Ojai	48	12, 4-22	703	Drilling
Oxnard	Edward F. Delaney Todd	1	6, 1-21		Bldg. rig
	Exeter Oil Co., Ltd., Lenox	2	6, 1-21		Bldg. rig
	Hub City Pet. Co., Chase	1	6, 1-21	22	Drilling
Piru	Pac. West. O. Corp., Temescal	14	4, 4-18	10313	Testing
	Standard Oil Co., Crestmont	1	14, 4-18	7202	Drilling
Sespe	Volunteer Pet. Co., Tar Creek	3	28, 5-19	1062	Drilling
South Mt.	F. E. Fairfield, S. M.	1	19, 3-20	4063	Fishing D.P.
Torrey Canyon	Union Oil Co., Torrey	60	5, 3-18	6146	Testing
Wiley Canyon	Wilshire Oil Co., Ventura Realty	1	1, 3-19		Grading

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Butte	Richfield Oil Corp., Chico	1	17, 21n-1e	5490	Coring
Contra Costa	Cal-Bay Corp., Faria	1	21, 2n-1w	4087	Drilling
Glenn	Richfield Oil Corp., Afton Comm.	1	2, 18n-1w		Grading
	Superior Oil Co., Glenn Com. Three	72-20	31, 21n-1w	6402	Drilling
Monterey	Royalty Service Corp., Federal	1	21, 24s-10e	5605	Drilling
Sacramento	Amerada Pet. Corp., Hausken Comm.	1	28, 5n-5e	6003	Completed
San Joaquin	Amerada Pet. Corp., Thompson & Folger	1	3, 4n-6e	3500	Abandoned
	Standard Oil Co., Fairoaks Comm.	1	19, 1n-7e		Rigging up
	Standard Oil Co., No. Roberts Isl.	1	36, 1n-5e	2732	Drilling
San Luis Obispo	Los Nietos Co., Scott	1	5, 31s-13e		Location
Solano	Standard Oil Co., Honker Comm.	1A	25, 3n-1w	7506	Drilling
	Standard Oil Co., A. O. Stewart	1	25, 3n-1w	6254	Drilling
	Standard Oil Co., Suisun Comm.	3	5, 3n-1w		Location
Sutter	Shell Oil Co., Inc., Shell-Buttes Comm.	C-1	12, 16n-1e		Grading
Yolo	Empire O. & G. Corp., Porterfield	1	18, 10n-2w		Location
	Shell Oil Co., Inc., Glide	1	15, 7n-3e	6696	Abandoned
	The Texas Co., Winchester Six	1	20, 7n-4e	5416	Abandoned

Los Olivos Cat Continues

Hub Oil Co. is coring ahead in its La Laguna No. 1 below 3600 ft. in hard Chert and Siltstone. A recent core taken at 3000 ft. recovered Sisquoc siltstone showing 30 degree dips. Hole is being put down on sec. 7-7n-30w north of the town of Los Olivos.

Monterey Test In Miocene

Royalty Service Corp. Federal No. 1 in section 21-24s-10e is spot coring ahead below 5600 ft. in hard Miocene brown shale showing flat dips. No oil showings have been encountered and well is reported to be running considerably lower structurally than the Shell Branch wells in this area.

Purisima Well Making Test

The Barham No. 1 well being drilled by the Whittier Associates Co. is making a pumping test of the Chert zone from 2632 ft. to 3333 ft. Located in the Los Alamos area on sec. 11-7n-32w, hole was drilled and cored to the total depth of 4847 ft. Botomed in hard grayish brown shale hole was plugged back to 3362 ft. and a combination liner landed at 3333 ft. and cemented thru perforations at 2632 ft.

Two Camarillo Tests in Basalt

Allied Properties Inc. Camarillo No. 2, sec. 4-1n-20w of the Conejo area, was abandoned at 123 ft. after finding the top of the Basalt at 49 ft. Operator is reported planning to drill another well in the area. North of this well in sec. 32-2n-20w Camarillo Oil Co. Camarillo No. 1 was last reported at 1509 ft. Top of the Basalt was found at 470 ft.

Brea Outpost Completed

Shell Oil Company has completed its westerly out post well Orange No. 22 for an initial production of 33 barrels per day of 20 gravity oil cutting 89% salt water. Located in sec. 2-3s-10w, about 800 ft. west of the nearest producing well, the well was drilled to a total depth of 5350 ft. and completed.

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San Joaquin Valley

Tejon Ranch Gets New Test

Richfield Oil Corporation has resumed operations on the Tejon Ranch in the Grapevine area. Rig has been built near the center of section 35-11n-19w for Tejon No. 5 approximately 1 mile southeast from Tejon No. 4 which was recently abandoned at the depth of 5625 ft.

Dominion Test Gets Sand

East of the Dominion Field Da Me Oil Company has bottomed well No. 3 in green sandy clay at 1395 ft. Located in sec. 27-26s-28e Vedder sand was cored from 1275 ft. to 1390 ft. Operator is now running casing to test this zone.

Union Spuds Rio Bravo Cat

Approximately 2 miles southwest of the Rio Bravo field Union Oil Company has spudded its deep test, Kerno No. 81-8. Located in section 8-29s-25e try was spudded on September 27 and is now being drilled ahead below 2000 ft. Operator expects to take a look at both the Stevens and Vedder sands. Objective depth is approximately 12,000 ft.

East Strand Test Sets Casing

Tide Water Associated Oil Company has 5½" casing standing cemented over the Stevens zone at 8180 ft. Located on sec. 8-30s-26e well found the "N" point at 7845 ft. and the top of the sand at 8180 ft. Total depth of the hole is 8207 ft.

Texas Co. Sets Pipe

The Texas Company Gill No. 71-21, sec. 21-13s-16e, drilled and cored to a total depth of 4801 ft. in gray sand and shale. The lower portion of the hole was plugged off and operator is now retesting the shut off on 5½" casing which was cemented at 4537 ft. They will gun perforate this string and attempt to complete from sands previously tested below 4440 ft. Northwest from this well location has been staked for Moffat No. 55-7 near the center of sec. 7-12s-15e.

The Texas Co. Tests Belgian Anticline

The Texas Company is drilling and spot coring at 1434 ft. in its Visalia No. 5, section 12-31-s-22e. Only gray sand and shale has been encountered below 1300 ft. Some fair looking oil sand was cored between 1200 ft. and 1260 ft. A formation test made of this interval recovered only 30 ft. of mud with a few spots of tar. West of this well, in section 11, Richfield Oil Corp. has completed another nice well on the Fairfield lease. Fairfield No. 18 was completed pumping an initial production of 141 bbls. per day of 15 gravity oil from a plugged depth of 1410 ft.

Cymric Test Gets Deep

Standard Oil Company McPhee Fee No. 37 located in sec. 36-29s-21e is drilling ahead in brown shale at 5010 ft. No showings have been encountered in the hole to date. Uni-

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Cantua Creek	Seaboard-Pure Oil Co., Corehole	1	28, 17-14	972	Abandoned
Huron	Gen. Pet. Corp., Burrel	68-35	35, 16-18	5900	Drilling
Jacalitos	Standard Oil Co., Well	67-17E	17, 21-15		Rigging up
	Standard Oil Co., Wells Fargo	1	30, 21-15		Location
Lanare	Amerada Pet. Corp., Cal. Lds.	65-15	15, 17-18		Cellar
Nicholson	Shell Oil Co., Inc., S.P.	73-35	35, 15-15		Rig
Polvadero	Standard Oil Co., Bourdieu	1A	1, 21-16	6384	Drilling
Raisin City	Seaboard Oil Corp., STU	31-14	14, 15-17	5297	Drilling
	Shell Oil Co., Inc., San Joaquin	1-1	10, 15-17	6376	Testing
	Univ. Consol. Oil Co., Taylor	1	14, 15-17		Rigging up
	Kern County				
Belridge—South	Atlas Prod. Co., Anderson	1	8, 29-21		Rigging up
	C.C.M.O. Co., Taylor	36-1	36, 28-20		Location
	Kohlbush & Lyons, U. S.	1	6, 29-22	1509	Abandoned
Belgian Anticline	The Texas Co., Visalia	5	12, 31s-22e	1434	Drilling
Comanche Point	T. W. Burnham, Chiquita	2	34, 12-19	2170	Idle
Cymric	Standard Oil Co., McPhee	37	36, 29-21	5010	Drilling
Edison	Tracy Harkness Seale	2	5, 30-29		Rigging up
	J. Paul Getty, Portals	3	5, 30-29	2250	Drilling
Elk Hills	Pacific Western and G. F. Getty, Transport	64	26, 30-24	5106	Drilling
Fruitvale	T.W.A. Oil Co., KCL	54-6	6, 29-27	1030	Drilling
Grapevine	Kern Line Oil Co., Well	1	19, 11-19	8701	Drilling
	Richfield Oil Corp., Tejon	5	35, 11n-19w		Bldg. rig
Jasmine	Barnhart-Morrow Cons., BM-Quinn	1	15, 25-27		Rigging up
	Western Gulf Oil Co., Well	1	4, 25-27		Location
Lost Hills	Union Oil Co., Ellis	8-11	11, 27-21	3914	Drilling
McClung	Continental Oil Co., KCL	H-1	18, 30-26		Rigging up
	Superior Oil Co., KCL	12	3, 30-26	13131	Testing
Midway	C.C.M.O. Co., Well	G-1	20, 31-22	3475	Drilling
Mt. Poso	Da-Me Oil Co., Well	3	27, 26-28	1395	Testing
	K. F. Gill Young	1	30, 27-28	2637	Suspended
Poso Creek	Butler Bros. Oil Co., Butler	1	14, 27-27		Rig
	Grandell Oil Co., Claflin	5	10, 27-27	1284	Completing
	Golden Bear Oil Co., Agey	4	28, 27-27	2058	Completing
	Pac. West'n O. Corp., Enas Fee	38	21, 27-27		Grading
Rio Bravo	Union Oil Co., Kerneo	81-8	8, 29-25	1027	Drilling
Round Mt.	Gen. Pet. Corp., Railroad	2	23, 28-28	680	Drilling
Shafter	Tide Water A. O. Co., Shafter Comm.	86-7	7, 28-25		Grading
Strand—East	T.W.A. Oil Co., KCL	54-8	8, 30-26	8207	Testing
Tehachapi	E. G. Cummings, Poor Boy	1	31, 32-32	1215	Idle
Temblor	B. F. Delanty, Well	69-A-1	36, 29-20	70	Idle
Williams	C.C.M.O. Co., Antelope Fee	12-2	12, 28-19		Location
	Kings County				
Hanford	Seaboard Oil Corp., Phillips	66-2	2, 19-22		Prep. to spud
Pyramid Hills	Pac. O. & G. Dev. Corp., CC&MO	1	17, 24-18	962	Idle
	Pac. O. & G. Dev. Corp., CC&MO	2	20, 24-18	935	Idle
	Madera County				
Herminghaus	The Texas Co., Gill	71-21	21, 13-16	4801	Testing
Firebaugh	The Texas Co., Moffat	1-7	7, 12-15	4308	Completed
	The Texas Co., Moffat	55-7	7, 12-15		Grading roads
	Tulare County				
Porterville	T.W.A. Oil Co., Corehole	87-11	11, 22-26	2719	Drilling

versal Consolidated Oil Company Sauer Dough No. 1, southeasterly extension test, was abandoned at the depth of 1198 ft. after a pumping test of the zone from 1155 ft. to 1198 ft. recovered only salt water with a trace of oil.

In the Cymric field proper the Honolulu Oil Corp. continues development of its properties in sections 25 and 26-29s-21e. Fitzgerald No. 61-26 was completed from plugged depth of 1456 ft. for an initial 120 bbls. per day of 12.8 gravity oil cutting 2.3%. Location has been graded for Fitzgerald 41-26 and 51-26 while on section 25 Well No. 8 is being rigged to pump after drilling to 1450 ft. and running a combination string of 6⅝" casing to 1303 ft.

Pacific Western Spuds Elk Hills Wildcat

On the north flank of the Elk Hills field Pacific Western Oil Corp. has spudded its Stevens zone test Transport No. 64. Located in sec. 26-30s-24e hole is currently being drilled ahead at 5106 ft. No work has started as yet on McNeil No. 1 in section 22.

Tide Water Starts Fruitvale "Cat"

Approximately 2 miles northwest of the Fruitvale field Tide Water Associated Oil Co. has started its Stevens zone test KCL No. 54-6. Located in sec. 6-29s-27e try was spudded on Sept. 24 and is currently being drilled ahead in sand and shale below 2000 ft.

Helm Wells Testing

West of the Helm field two wells have reached the testing stage. Amerada Petroleum Corp. Wheatville Ranch No. F-45-8 was bottomed at 8200 ft. and 5½ in. casing cemented at 8010 ft. Operator is currently engaged in attempting to shut off water above and below the zone at 7978 ft. On a recent test of gun perforations in the interval 7978 ft. to 7983 ft. well flowed at a 200 bbl. per day rate of 28 gravity oil cutting 10% salt water. Well is located in sec. 8-17s-18e. North of this well, in Section 5, General Petroleum Corp. is testing the Cretaceous sand found in their Noble No. F-4-5. The interval tested to date has yielded only salt water, however this is only the lower portion of sand and not expected to produce. The better looking part of the zone from 7900 ft. to 7935 ft. will be tested after cementing off the present perforations at 8044 ft.

N. W. Raisin City Becomes Active

Shell Oil Company's San Joaquin No. 1-1 drilled and cored to a total depth of 6376 ft. in gray Eocene sand. Located in sec 10-15s-17e, approximately 2 miles Northwest of the Raisin City field, only 4 ft. of oil stained sand was found at the top of the Eocene. Hole has now been plugged to 4978 ft. and 6⅝ inch casing is standing cemented at 4975 ft. The operator intends to complete the well from the gas sand from 5975 ft. to 5035 ft. which, on an earlier test, blew dry gas at an estimated rate of 22,000 MCF per day. Preliminary correlations place the top of the Eocene approximately 65 ft. lower on the structure than the Seaboard STU well to the southeast. Approximately 1 mile to the southeast, in sec. 14-15s-17e, Seaboard Oil Corp. is drilling ahead in its STU No. 31-14 at 5297 ft. In this same section Universal Consolidated Oil Company is preparing to spud its Taylor No. 1.

Coalinga Gets Extension Test

Approximately one mile east of the Coalinga Eocene field The Texas Company is grading roads and location for a deep test well which will be known as SP No. 58-21. Hole will go down near the South ¼ corner of sec. 21-19s-16e. Objective will be sands in the Eocene which should be encountered above 9000 ft.

Cantua Creek Again Active

The Seaboard Oil Company and Pure Oil Co. are giving this area a thorough going over. The combine is currently engaged in drilling the second corehole of an extensive program. Core Hole No. 1, located on sec. 28-17s-14e, was abandoned after drilling to a depth of 972 ft. The second effort, located on Section 32 of the same Township and Range, is being drilled ahead below 500 ft. No information is being released by the operator as to the findings in these holes.

Huron Test Gets Deeper

General Petroleum Corporation is drilling ahead in Temblor shale with streaks of sand below 5900 ft. in Burrel No. 68-35 on sec. 35-16s-18e, midway between the Helm and Riverdale fields. Objective of the test is sands in the Cretaceous zone which are expected to be found at approximately 8000 ft.

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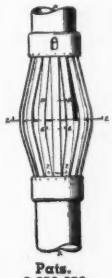

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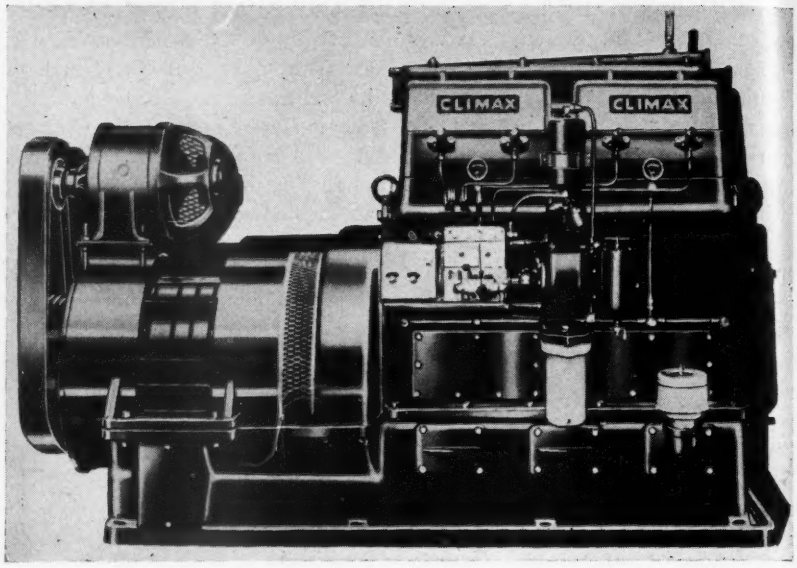

The production of two solid injection, compression ignition engines has just been announced by Climax Engineering Company of Clinton, Iowa. These prime movers are additions to the company's extensive line of Blue Streak gas engines, 8 to 480 h.p., generating sets, 300 watts to 312 kva, and complete accessory equipment.

Both new engines are 4-cycle, full diesels and intended for use as light plants and primary drives for pumps, compressors, mills, mine equipment, marine service, etc.

Model D148 is a two-cylinder unit with a maximum rating of 22 h.p. It may be equipped for pulley drive with or without clutch or clutch and reduction gear or auxiliary power take-off. As a diesel electric plant it may be direct connected, on a single base, with a 15 kva generator.

Model D297 is a four-cylinder unit with a maximum rating of 44 h.p. Drive equipment similar to Model D148 may be furnished. A special feature of D297, however, is that a flywheel, clutch, generator or marine gears may be installed on either or both ends, providing a radiator is not used. For electric power and light, the D297 may be used to power a 30 kva generator.

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D148 engine and generator—76 in. x 32 in.

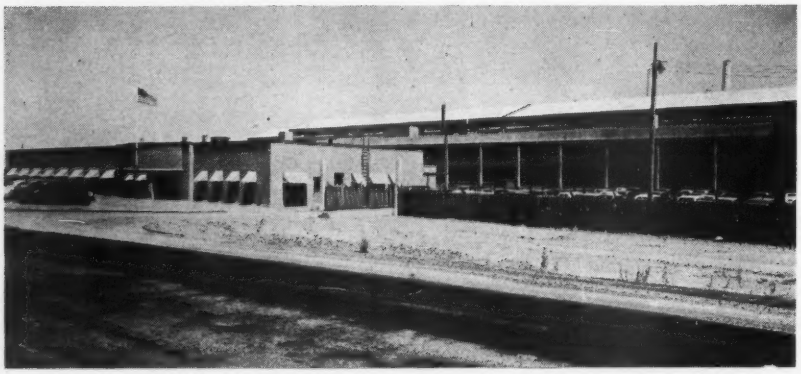
D279 engine and equipment—66 in. x 32 in.

D279 engine and generator—92 in. x 32 in.

Columbia Steel Announces Completion of New Foundry

One of the largest and most modern foundries in the United States, comprising forty-three acres, built by the Defense Plant Division of Columbia Steel Company, a U. S. Steel subsidiary, near Pittsburg, California, has been completed and is now in operation, Columbia Steel Company officials announced on September 13.

The new project, which is located on property adjacent to Columbia Steel Company's Pittsburg Works, was constructed at a cost of more than $6,000,000 at the expense and for the account of Defense Plant Corporation. The Government has contracted Columbia Steel Company to operate the new foundry for the duration of the war.



A view of the administration building of the new foundry, which was built by Columbia Steel Company, a U. S. Steel subsidiary, near Pittsburg, California.

When running in full capacity, the new foundry will provide approximately 30,000 tons of steel castings annually. However, a shortage of skilled manpower and the delayed delivery of several installations will retard the foundry getting into full production for several weeks.

Products of the plant will be used primarily by the United States Navy and Maritime Commission. Facilities of the new plant include two twenty-five ton basic open hearth furnaces. A six-ton electric furnace is expected to be delivered for installation in a few weeks.

A "U" shaped structure, equipped with the latest of machinery, the new foundry is so constructed to provide a smooth flow of products. A cleaning bay is located on each side of the "U".